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SCS ENGINEERS, PC

TIER 2 NMOC EMISSION RATE REPORT FOR THE WHITE STREET LANDFILL GREENSBORO, NORTH CAROLINA

Presented by:

SCS ENGINEERS, PC
129 West Trade Street, Suite 1630
Charlotte, North Carolina 28202
(704) 377-4766

Prepared for:

CITY OF GREENSBORO
Environmental Services Department
2503 White Street
P.O. Box 3136
Greensboro, NC 27402-3136
(336) 373-4107

File No. 02203314.00
August 2, 2004

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August 2, 2004
Project No. 02203314.00

Mr. Greg Tomasson
City of Greensboro
Environmental Services
P.O. Box 3136
Greensboro, North Carolina 27402

Subject: Tier 2 NMOC Emissions Report
White Street Landfill
Greensboro, North Carolina

Dear Greg:

SCS Engineers, PC (SCS) is pleased to submit four copies of the Tier 2 non-methane organic compound (NMOC) report for the White Street Landfill. SCS personnel performed the Tier 2 field testing on June 15, 2004 in general accordance with the NCDENR-approved sampling protocol prepared on behalf of the City of Greensboro (City) by SCS. As shown in the report, the sampling and analysis indicate the NMOC emissions for the White Street Landfill exceed the 50 Mg/year threshold established by the New Source Performance Standards (NSPS). Our report concludes that the City has two options as a result of the NMOC emissions. These options are:

1. Conduct Tier 3 methane generation rate sampling and analysis as provided in 40 CFR 60.754(a)(4) in hopes of lowering the site-specific k constant; or,

2. Submit a Gas Collection and Control System Design Plan (GCCS Design Plan) within one year of the emissions exceedance date in accordance with 40 CFR 60.752(b)(2)(i). As we understand it, the due date of the GCCS Design Plan is May 18, 2005.

Based on SCS's experience, Tier 3 testing can be a costly process that often does not produce the desired results (i.e., significantly lowering the site's NMOC concentration). For these reasons, SCS does not recommend a Tier 3 test for the White Street Landfill.

As discussed, SCS plans to meet with the City next week to discuss this report and future NSPS-related activities. We will contact you in a few days to arrange the meeting. In the meantime, if you have any questions regarding this report, please do not hesitate to contact either Erin Conklin at 478-284-9392, or Steve Lamb at 704-377-4766.

Sincerely,

Erin C. Conklin
Staff Engineer
SCS ENGINEERS, PC

Steven C. Lamb, P.E.
Office Manager
SCS ENGINEERS, PC

Attachment

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TABLE OF CONTENTS

CERTIFICATION STATEMENT

This Tier 2 NMOC Emissions Rate Report has been prepared for the White Street Landfill by SCS Engineers, PC on behalf of the City of Greensboro. This report was prepared for compliance with the New Source Performance Standards (NSPS) 40 CFR 60, Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills – in accordance with the NSPS.

Final Report Prepared By:

Steven C. Lamb - Project Director

Print Name and Title

Signature

8-2-2004

Date

The undersigned facility representative certifies that to best of their knowledge, the facility was operating at normal conditions during the site-specific (Tier 2) test and that the information contained within this report is an accurate representation of their facility and its processes and measured emissions.

Responsible Facility Representative:

Print Name and Title

Signature

Date

INTRODUCTION

On March 12,1996, the Environmental Protection Agency (EPA) promulgated the New Source Performance Standards (NSPS) and Emissions Guidelines (EG) for new and existing landfills under Section III (b) of the Clean Air Act (CAA). The basis for this legislation is EPA's determination that municipal solid waste (MSW) landfills contribute significant amounts of air pollution that is potentially detrimental to public health. The NSPS are intended to control non-methane organic compound (NMOC) and methanogenic emissions from MSW landfills. NMOCs include volatile organic compounds (VOCs), hazardous air pollutants (HAPs), and odorous compounds. The NSPS applies to landfills having a design capacity greater than 2.5 million Megagrams (Mg) (2.75 million tons), that were permitted, modified, or reconstructed after May 30, 1991.

The City of Greensboro (City) owns and operates the White Street Landfill (Landfill). The Landfill is regulated under the NSPS based upon both a design capacity exceeding 2.5 million Mg and a Tier 1 NMOC emission rate calculation which demonstrated an annual NMOC emission rate exceeding 50 Mg (55 tons) per year. Section 60.757(c)(1) states that if the Tier 1 analysis results in NMOC emissions greater than 50 Mg per year, a revised NMOC Emission Rate Report can be submitted using data gathered from a site-specific, Tier 2 analysis.

In April 1999, Tier 2 testing was conducted by SCS Engineers, PC (SCS) at the Landfill. Results of the April 1999 Tier 2 indicated NMOC emissions through April 2004 to be less than 50 Mg/year, so the Landfill was not required to install an NSPS-compliant gas collection and control system (GCCS). Since Tier 2 results are only valid for five years, the City retained SCS to conduct a new Tier 2 NMOC emissions test in 2004. This report summarizes the results of the new Tier 2 analysis.

This Tier 2 report was prepared by SCS on behalf of the City to quantify the NMOC emissions for compliance with the NSPS (40 CFR Part 60, Subpart WWW) by presenting Tier 2 sampling, analysis, and a revised NMOC emissions estimate. This report includes sections describing the field sampling procedures and activities, the results of the laboratory analysis, estimates of current and projected annual NMOC emissions, and overall conclusions.

SITE BACKGROUND

The Landfill (Solid Waste Permit No. 41-03) encompasses an area of approximately 767 acres within the city limits in the northeast quadrant of the City, at the east end of White Street. The Landfill is used for the disposal of MSW generated within the City and Guilford County. Beginning in 1943, waste disposal at the Landfill consisted primarily of incineration. Burning operations ceased in 1965, and since that time refuse has been buried on site.

White Street Landfill consists of several distinct municipal solid waste (MSW) landfill areas, which for the purpose of this compliance issue, are grouped into three phases: Phase I, Phase II and Phase III. Phase I is the oldest of the three areas. It is approximately 65 acres in size and contains land clearing and inert debris (LCID) deposited on top of MSW. This phase was filled with MSW between the years 1965 and 1978 and contains approximately 3.0 million tons of MSW. The City began disposing of LCID on top of the MSW in 1999 and is currently continuing this activity. Phase I does not have a landfill gas (LFG) collection system.

Phase II is an unlined, 145-acre area that received approximately 5.4 million tons of MSW from 1978 to 1997. A comprehensive active LFG extraction system is installed and operated by Duke Engineering and Services (DES) in this phase. LFG from Phase II is collected and either conveyed to Cone Mills via a transmission pipeline, or flared at the Phase II blower/flare station.

Phase III, a subtitle-D lined, 52-acre area, began receiving waste in 1997. Phase III consists of three cells. Cell 1 is approximately 25 acres in size and contains eight horizontal collectors that convey LFG to a passive flare. Cell 2 is approximately 15 acres in size and is the current active portion of the Landfill. Cell 2 contains seven horizontal LFG collectors that are not connected to a flare at this time. However, in the next several months, the City will be connecting the collectors from Cells 1 and 2 to a new blower/flare station located just east of Phase III. Cell 3 is approximately 12 acres in size and filling has not yet begun in this area.

TIER 2 NMOC SAMPLING

SCS performed site-specific Tier 2 NMOC field sampling for the White Street Landfill on June 15, 2004, in accordance with procedures outlined in the NSPS and SCS's sampling protocol. A copy of the Tier 2 sampling protocol prepared by SCS is provided in Appendix A. In addition, the North Carolina Department of the Environment and Natural Resources (NCDENR) approved the methodology of the sampling protocol prior to the field sampling. The approval letter from NCDENR is included in Appendix B.

Field Sampling Procedures

In the Tier 2 sampling protocol, SCS requested that the EPA and NCDENR consider a minor modification for the Tier 2 sampling program at the White Street Landfill. Subpart WWW, section 60.754 (a) (3) requires at least two LFG samples be collected per hectare (2.47 acres) of landfill surface that has retained waste for at least two years. Since the Landfill consists of three distinct phases, the sampling procedure for each phase is different. Refer to Appendix A for more information.

Tier 2 Field Sampling Activities

The Tier 2 NMOC field samples were collected at the Landfill on June 15, 2004. Present at the site during the sampling activities were representatives from the City and SCS. Prior to sampling, SCS personnel verified with Landfill personnel that the active LFG collection system in Phase II was operating normally and all applicable wells and collectors had applied vacuum at the time of the Tier 2 test. Pursuant to the above referenced sampling "procedure", the following samples were obtained:

- Three representative LFG samples were obtained from the main header upstream from the existing blower and condensate knockout in Phase II;
- Three representative LFG samples were obtained from the header upstream of the flame arrestor and passive flare in Phase III, Cell 1; and,
- Seven samples were obtained from the passive horizontal collectors in Phase III, Cell 2.

Although sampling LFG from Phase I was included in the sampling protocol, SCS did not obtain LFG samples from Phase I. Phase I sampling was postponed pending the results and our analysis of the Phase II and III samples.

The sampling locations are shown in Appendix C. Field equipment used during the sampling activities included a LandTec® GEM 500 Infrared Gas Analyzer, an EPA Method 25 C approved sampling train with an attached Cole-Palmer® digital pressure gauge, and nine 6-liter stainless steel SUMMA sample canisters. In accordance with EPA Method 25 C, the sampling apparatus was connected to the LFG sample port and purged using the GEM unit.

Once valid LFG readings were verified, approximately 3 liters of LFG were collected into each SUMMA canister at a maximum rate of 500 ml/min. An individual SUMMA canister was used for each of the six LFG header samples collected in Phase II and Phase III, Cell 1, and composite sampling into three SUMMA canisters was used in Phase III, Cell 2.

SCS shipped the LFG sample canisters to AtmAA, Inc. (AtmAA) in Calabasas, California, for subsequent analysis. Appendix D contains the Tier 2 sampling logs and AtmAA chain of custody forms.

TIER 2 NMOC LABORATORY ANALYSIS AND EMISSIONS ESTIMATE

Tier 2 Laboratory Analytical Results

A laboratory analysis of the LFG samples was performed by AtmAA using EPA Methods 25C and 3C. Measured NMOC concentrations from the SUMMA canisters were

corrected for moisture and nitrogen per standard procedures. SCS provided AtmAA with the field conditions (temperature and barometric pressure) at the time of LFG sampling to achieve an accurate calculation of the NMOC concentration.

Based on the laboratory results, the Landfill's average NMOC concentration for Phase II is **4,047** ppmv, for Phase III, Cell 1 is **7,842** ppmv and for Phase III, Cell 2 is **3,843** ppmv, all reported as carbon. Since the EPA Landfill Air Emissions Estimation Model (LAEEM) requires the input of the NMOC concentration in terms of hexane, the laboratory NMOC concentration in terms of carbon was converted to hexane by dividing by six. This resulted in an average NMOC concentration of **675** ppmv as hexane in Phase II, **1,307** ppmv as hexane in Phase III, Cell 1, and **640** ppmv as hexane in Phase III, Cell 2. These site-specific NMOC concentrations are used in evaluating the Landfill's revised NMOC emissions.

$$NMOCConc_{PhaseII} = \left(\frac{3{,}993\,ppmv + 3{,}937\,ppmv + 4{,}210\,ppmv}{3}\right) = \left(\frac{4{,}047\,ppmv_{carbon}}{6}\right) = 675\,ppmv_{hexane}$$

$$NMOCConc_{PhaseIII,Cell1} = \left(\frac{7{,}696\,ppmv + 7{,}825\,ppmv + 8{,}004\,ppmv}{3}\right) = \left(\frac{7{,}842\,ppmv_{carbon}}{6}\right) = 1{,}307\,ppmv_{hexane}$$

$$NMOCConc_{PhaseIII,Cell2} = \left(\frac{(3{,}433\,ppmv * 3) + (4{,}731\,ppmv * 3) + (2{,}407\,ppmv * 1)}{7}\right) = \left(\frac{3{,}843\,ppmv_{carbon}}{6}\right) = 640\,ppmv_{hexane}$$

EXHIBIT 1. NMOC LABORATORY SUMMARY

Sample Identification Number	Sample Description	NMOC Carbon (ppmv)	NMOC Hexane (ppmv)
WSL-061504-01	Phase II Header Sample	3,993	666
WSL-061504-02	Phase II Header Sample	3,937	656
WSL-061504-03	Phase II Header Sample	4,210	702
WSL-061504-04	Phase III, Cell 1 Header Sample	7,696	1,283
WSL-061504-05	Phase III, Cell 1 Header Sample	7,825	1,304
WSL-061504-06	Phase III, Cell 1 Header Sample	8,004	1,334
WSL-061504-04	Phase III, Cell 2 Collector Sample	3,433	572
WSL-061504-04	Phase III, Cell 2 Collector Sample	4,731	789
WSL-061504-04	Phase III, Cell 2 Collector Sample	2,407	401

Tier 2 Landfill Emissions Estimation Model Outputs

The Tier 2 NMOC emissions estimates for the Landfill (Phases II and III only) were performed using the EPA LAEEM. The model inputs established in Section 60.754(a)(1), the site's field-derived average NMOC concentrations, and the refuse fill history of the facility were used to perform the Tier 2 models and are as follows:

- Methane Generation Potential (Lo) – 170.0 m^3/Mg. (*Default value cited by NSPS*)
- Methane Generation Rate Constant (k) – 0.05 1/year. (*Default value cited by NSPS*)
- Phase II NMOC Concentration – 675 ppmv as hexane. (*Field sampling values*)
  Phase III, Cell 1 NMOC Concentration – 1,307 ppmv as hexane
  Phase III, Cell 2 NMOC Concentration – 640 ppmv as hexane
- Refuse Filling History – SCS used tonnage records provided by the City, and estimated by projecting waste disposal based upon a five percent yearly increase.

According to the EPA LAEEM, the 2004 NMOC emissions from Phases II and III exceed the 50 Mg/year threshold for the Landfill. Since the NMOC emissions exceed the 50 Mg/year threshold for Phases II and III, site-specific NMOC testing for Phase I was not conducted. Copies of the Tier II model outputs are included in Appendix F. The results of the models are summarized below in Exhibit 2.

EXHIBIT 2. NMOC EMISSIONS ESTIMATE

Year	Site-Wide Refuse In-Place (tons)	Phase II NMOC Generation Rates (Mg/yr)	Phase III, Cell 1 NMOC Generation Rates (Mg/yr)	Phase III, Cell 2 NMOC Generation Rates (Mg/yr)	Phases II & III NMOC Generation Rates (Mg/yr)
2004	10,075,048	97	55	20	**172**
2005	10,210,501	92	53	23	**168**
2006	10,351,991	87	50	27	**164**
2007	10,500,556	83	48	30	**161**
2008	10,656,549	79	45	34	**158**

CONCLUSIONS AND RECOMMENDATIONS

Since the Landfill has exceeded the 50 Mg/year NMOC emission rate, one of the following options must now be implemented.

- Conduct Tier 3 methane generation rate sampling and analysis as provided in 40 CFR §60.754(a)(4) in hopes of lowering the site-specific k constant; or,

- Submit a GCCS design plan prepared by a professional engineer within one year of the emissions exceedance date in accordance with 40 CFR §60.752(b)(2)(i), namely May 18, 2005. Installation of the GCCS must be complete within 18 months after the submittal of the design plan (November 18, 2006).

It should be noted that Tier 3 testing can be a costly process that often does not produce the desired results (i.e., significantly lowering the site's NMOC concentration). For these reasons, SCS rarely recommends this type of testing and does not recommend a Tier 3 for the White Street Landfill.

APPENDIX A

SCS SAMPLING PROTOCOL AND SIGNIFICANT CORRESPONDENCE

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SCS ENGINEERS, PC

April 28, 2004
File No. 02203314.00

Mr. Gregg O'Neal
North Carolina Department of Environment and Natural Resources
Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Subject: NSPS Tier 2 Sampling Protocol
White Street Landfill – Greensboro, North Carolina

Dear Mr. O'Neal:

SCS Engineers, PC (SCS) is pleased to submit the testing protocol for Tier 2 sampling at the White Street Landfill (Landfill) in Greensboro, North Carolina. The Landfill is regulated according to the U.S. Environmental Protection Agency's (EPA's) New Source Performance Standards (NSPS) for Municipal Solid Waste Landfills. Using Tier 1 defaults provided in the EPA's Landfill Gas Emission Model (LandGEM), the Landfill's estimated non-methane organic compound (NMOC) emissions were greater than 50 Megagrams (Mg) per year. As a result, Tier 2 sampling was performed in April 1999 by SCS Engineers to establish a site-specific NMOC concentration. Since the site-specific NMOC concentration is only valid for five years, SCS will determine a new site-specific NMOC concentration for the Landfill using EPA Method 25C (i.e., Tier 2 sampling).

Accordingly, SCS has developed a sampling protocol to determine the site-specific NMOC concentration in the LFG at the Landfill. A complete discussion of the proposed sampling program is included as Attachment A for your review and approval.

If you have any questions about this submittal, please feel free to call either of the undersigned at (704) 377-4766.

Very truly yours,

Erin C. Conklin/SCL
Erin C. Conklin
Staff Engineer
SCS ENGINEERS, PC

Steven C. Lamb, P.E.
Office Director
SCS ENGINEERS, PC

Attachment A – Sampling Protocol

cc: Greg Thomasson, City of Greensboro

ATTACHMENT A

TIER 2 SAMPLING PROTOCOL

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SCS ENGINEERS, PC

April 28, 2004
File No. 02203314.00

FILE COPY

Mr. Ray Stewart
North Carolina Department of Environment and Natural Resources
Division of Air Quality, Winston-Salem Regional Office
585 Waughtown Street
Winston-Salem, North Carolina 27107

Subject: NSPS Tier 2 Sampling Protocol
White Street Landfill – Greensboro, North Carolina

Dear Mr. Stewart:

SCS Engineers, PC (SCS) is pleased to submit the testing protocol for Tier 2 sampling at the White Street Landfill (Landfill) in Greensboro, North Carolina. The Landfill is regulated according to the U.S. Environmental Protection Agency's (EPA's) New Source Performance Standards (NSPS) for Municipal Solid Waste Landfills. Using Tier 1 defaults provided in the EPA's Landfill Gas Emission Model (LandGEM), the Landfill's estimated non-methane organic compound (NMOC) emissions were greater than 50 Megagrams (Mg) per year. As a result, Tier 2 sampling was performed in April 1999 by SCS Engineers to establish a site-specific NMOC concentration. Since the site-specific NMOC concentration is only valid for five years, SCS will determine a new site-specific NMOC concentration for the Landfill using EPA Method 25C (i.e., Tier 2 sampling).

Accordingly, SCS has developed a sampling protocol to determine the site-specific NMOC concentration in the LFG at the Landfill. A complete discussion of the proposed sampling program is included as Attachment A for your review and approval.

If you have any questions about this submittal, please feel free to call either of the undersigned at (704) 377-4766.

Very truly yours,

Erin C. Conklin /scl
Erin C. Conklin
Staff Engineer
SCS ENGINEERS, PC

Steven C. Lamb, P.E.
Office Director
SCS ENGINEERS, PC

Attachment A – Sampling Protocol

cc: Greg Thomasson, City of Greensboro

ATTACHMENT A

TIER 2 SAMPLING PROTOCOL
WHITE STREET LANDFILL
GREENSBORO, NORTH CAROLINA

This protocol describes the method for selecting sample locations and the procedures for collecting landfill gas (LFG) samples at White Street Landfill located in Greensboro, North Carolina. The purpose of the sampling is to establish a site-specific non-methane organic compound (NMOC) concentration in the LFG for use in determining the applicability of the New Source Performance Standards (NSPS) to LFG collection at the White Street Landfill.

This protocol was prepared by SCS Engineers, PC (SCS) on behalf of the City of Greensboro and the White Street Landfill.

BACKGROUND

White Street Landfill consists of several distinct municipal solid waste (MSW) landfill areas, which for the purpose of this compliance issue, are grouped into three phases: Phase I, Phase II and Phase III. Phase I is the oldest of the three areas. It is approximately 65 acres in size and contains land clearing and inert debris (LCID) deposited on top of MSW. This phase was filled with MSW between the years 1965 and 1978 and contains approximately 3.0 million tons of MSW. The City of Greensboro (City) began disposing of LCID on top of the MSW in 1999 and is currently continuing this activity. Phase I does not have a LFG collection system.

Phase II is an unlined, 145-acre area that received approximately 5.4 million tons of MSW from 1978 to 1998. A comprehensive active LFG extraction system is installed and operated by Duke Engineering and Services (DES) in this phase. LFG from Phase II is collected and either conveyed to Cone Mills via a transmission pipeline, or flared at the Phase II blower/flare station.

Phase III, a subtitle-D lined, 52-acre area, began receiving waste in 1997. Phase III consists of three cells. Cell 1 is approximately 25 acres in size and contains a horizontal collector gas extraction system that conveys LFG to a passive flare. Cell 2 is approximately 15 acres in size and is the current active portion of the landfill. Cell 2 contains five horizontal LFG collectors that are not connected to a flare at this time. However, in the next few months, the City of Greensboro will be connecting the collectors from Cells 1 to a new blower/flare station located next to Phase III. Cell 3 is approximately 12 acres in size and filling has not yet begun in this area.

SAMPLE LOCATIONS

Section 60.754(a)(3) of the NSPS for municipal solid waste landfills states that when conducting Tier 2 testing, the landfill owner must install at least two sample probes per hectare (2.47 acres) of landfill surface that has retained waste for at least two years. However, if the landfill is larger than 25 hectares in area, only 50 samples are required.

The total landfilled area at White Street Landfill is approximately 250 acres (101 hectares). Since the area of landfill at the site is greater than 25 hectares, 50 probes are required. To space the probes evenly across the landfill, a probe density of 1 probe per 5 acres is necessary. This would result in 13 probes in the 65-acre Phase I area, 29 probes in the 145-acre Phase II area, and eight probes in the Phase III area.

PHASE I PROBED SAMPLES

Samples from Phase I will be collected using the pilot probe procedure described in U.S. EPA Method 25C. SCS will use composite sampling as allowed under §60.574(b)(3). A maximum of five samples will be collected into a single canister, with each sample being of equal volume. Since the MSW in Phase I has been mostly overfilled by LCID, SCS intends to composite samples in this phase from the area that has not been overfilled by LCID. By collecting samples from this area, SCS will be avoiding areas of known nondegradable solid waste, as specified in §60.574(a)(3). Each sample probe will be installed to a depth of at least one meter below the bottom of the landfill cap, which is estimated to be two to three feet thick. The maximum probe depth will be approximately 12 feet (3.7 meters). A direct-push (geoprobe) rig will be used to install the probes. After pushing the pilot probe to the required depth, the pilot probe will be removed and a stainless steel sampling probe will be installed in the pilot hole. The sampling probe will be capped at the bottom, and the bottom one-third will be perforated. A threaded cap and sampling attachment will be connected to the top of the probe. The annular space around the probe at the top of the hole will be filled with soil from the existing landfill cap.

The sampling train will be in accordance with Method 25C and include the following components: teflon tubing, purge pump or vacuum tank, sampling valves, rotameter, vacuum gauge and a pre-evacuated six-liter stainless steel SUMMA canister.

The sampling procedure will be in accordance with Section 4.4 of Method 25C. A purge pump or vacuum tank will be used to evacuate at least two probe volumes at a flow rate of 500 milliliters per minute (ml/min) or less. After purging, a Landtec GEM-500 gas monitor will be used to measure the volumetric concentrations of methane, carbon dioxide, oxygen and balance gas, which is assumed to be almost entirely nitrogen. The purpose of measuring gas quality with the GEM-500 is to ensure that the nitrogen concentration is less than 20 percent as required by Method 25C. The oxygen reading is also important in the case where the LFG contains a high concentration of residual nitrogen.

U.S. EPA is aware of the potential of high residual nitrogen in some landfills and has amended Method 25C to address this issue. After checking the gas quality, the sample valves will be turned so that LFG will only flow to the SUMMA canister, and the rotameter will be closed. The valve on the canister will be opened and the rotameter adjusted to allow a sampling flow rate of 500 ml/min or less. During sampling, the sampling data such as canister vacuum, sampling time and flow rate, etc. will be recorded. After one liter of gas is collected, the canister will be closed and the sampling probe removed. The abandoned hole

will be filled with soil. As mentioned earlier, equal volumes of LFG samples will be composited into canisters at a maximum rate of three samples per six-liter canister.

PHASE II HEADER SAMPLES

Because a comprehensive LFG collection system is installed in Phase II, SCS proposes to collect gas samples from the main LFG header instead of using shallow probes. This method was previously used five years ago at this site and has since been clarified in the Federal Register Section 60.754, dated October 17, 2000. The LFG samples will be taken at a location along the header between Phase II and the blower/flare station, prior to the main condensate knockout tank. Three samples of at least three liters each will be collected into separate canisters from the sample location. In past guidance, EPA has stated that three samples should be taken when sampling using this alternative procedure. This approach is also consistent with the sampling method suggested in §60.754(b)(2) for determining NMOC concentrations at landfills seeking to determine if the collection systems can be shut down as provided in §60.752(b)(2)(v). Since the LFG collection system influences a larger volume of refuse than would probes installed one meter into the refuse, it is reasonable to expect a more representative gas sample from the LFG collection system than would be provided by shallow probes.

PHASE III HEADER SAMPLES

Currently, Phase III, Cell 1 has eight horizontal LFG collectors that run north to south in the cell and are overlain with approximately 30 feet of MSW. These horizontal LFG collectors are connected to a temporary aboveground header pipe that conveys LFG to a passive flare. In the next few weeks, the City of Greensboro is connecting these horizontal collectors to the Phase III blower flare station by installing a permanent belowground header pipe. Rather than install shallow probes in this landfill area, SCS proposes to collect LFG samples from the permanent header in the manner described in the sampling procedure for Phase II above (e.g. three samples of at least three liters each). Since the LFG collection system influences a larger volume of refuse than would probes installed one meter into the refuse, it is reasonable to expect a more representative gas sample from the LFG collection system than would be provided by shallow probes.

Phase III, Cell 2 has five horizontal collectors that run north to south in the cell and are overlain with approximately 30 feet of MSW. Rather than install shallow probes in this landfill area, SCS proposes to collect LFG samples from each horizontal collector. The five samples collected will be composited into two SUMMA canister as allowed under §60.574(b)(3). Because these collectors are relatively deep and directly influence a greater volume of refuse than shallow probes, samples taken from the collectors will be more representative of the overall LFG quality than samples taken from probes. This is similar to the rationale for sampling from the main LFG collection system header described above, and has been approved by U.S. EPA as an acceptable approach on numerous occasions.

SAFETY CONSIDERATIONS

Landfill gas contains methane and therefore is potentially explosive. SCS personnel are experienced with landfill operations, LFG collection systems, and the proper sampling and handling of LFG. Standard safety precautions include refraining from smoking or creating sparks near the test site and using explosion-proof equipment. SCS will follow safety precautions outlined in EPA Method 25C.

No special safety equipment is required for the test. However, all testing personnel will wear clothing appropriate for a landfill environment such as steel-toed boots and long pants. Hard hats, ear protection, and eye protection are not specifically required by the Landfill at the testing site; however, all testing personnel will have such equipment available to use, as needed based on field conditions.

LABORATORY ANALYSIS

Samples will be shipped to a laboratory for NMOC analysis per Method 25C and nitrogen and oxygen analysis per Method 3C. The resulting site-specific NMOC concentrations will then be used in EPA's Landfill Gas Emission Model to calculate the Tier 2 NMOC emissions. Note that the analytical results of the three samples from the LFG collection header in Phase II will be averaged; the average NMOC concentration is the one that will be used to model NMOC generation from Phase II. Likewise, the average NMOC concentration from the probed samples will be used to model NMOC generation from Phase I and the average weighted concentration from the samples collected in the two cells in Phase III will be used to estimate NMOC generation from Phase III.

AUDIT SAMPLES

While Method 25C includes a provision for the possible use of audit samples, it is our understanding through numerous conversations with U.S. EPA that since an audit sample appropriate for EPA Method 25C has not yet been developed, they are not recommending their use at this time. Furthermore, EPA recommends against using any substitute audit sample (such as one for Method 25) in its place, since the organic components may not be appropriate. In addition, EPA has not yet established pass-fail criteria for a Method 25C audit sample. For the reasons stated above, audit samples will not be used for the Tier 2 sampling and analysis.

FINAL REPORT

Upon completion of the sampling and analysis, a Tier 2 NMOC emission estimate report will be prepared and submitted to the North Carolina Department of Environment and Natural Resources (NCDENR). This report will include the following:

- Letter report summarizing the fieldwork, lab results, and NMOC emission calculations;
- Copies of significant correspondence between SCS and NCDENR;

- Copies of field sampling forms;
- Copy of lab data report including the chain of custody;
- Site plan showing the sample locations; and,
- LandGEM modeling and appropriate calculations.

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SCS ENGINEERS, PC

May 4, 2004
File No. 02203314.00

Mr. Gregg O'Neal
North Carolina Department of Environment and Natural Resources
Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Subject: NSPS Tier 2 Sampling Protocol – Additional Information
White Street Landfill – Greensboro, North Carolina

Dear Mr. O'Neal:

SCS Engineers, PC (SCS) is pleased to submit the testing protocol form for Tier 2 sampling at the White Street Landfill (Landfill) in Greensboro, North Carolina. This submittal is per your telephone request on April 29, 2004. Please attach the enclosed information to the previous submittal of Attachment A, Tier 2 sampling protocol.

If you have any questions about this submittal, please feel free to call either of the undersigned at (704) 377-4766.

Very truly yours,

Erin C. Conklin /SCL
Erin C. Conklin
Staff Engineer
SCS ENGINEERS, PC

Steven C. Lamb, P.E.
Office Director
SCS ENGINEERS, PC

Attachments

cc: Ray Stewart, NCDENR DAQ – Winston-Salem Regional Office
Greg Thomasson, City of Greensboro

PROTOCOL SUBMITTAL FORM

DIVISION OF AIR QUALITY

Purpose: *The primary goals of the Protocol Submittal Form are to initiate communication between representatives of the permitted facility, the testing consultants, and the DAQ as well as to identify and resolve any specific testing concerns prior to testing.*

Instructions: ***Submit all forms and additional information to the DAQ Regional Supervisor at least 45 days prior to testing****. Please type or print clearly. Complete one form for each sampling location. If this form does not supply sufficient space to completely answer all questions or if additional relevant information is necessary,* ***attach*** *additional documentation and/or information to the original form. Questions and/or comments should be directed to the appropriate Regional Supervisor.*

This form is available from the DAQ website (http://daq.state.nc.us/enf/sourcetest/)

Specify Appropriate Regional Office: (check one)

☐ *Asheville* ☐ *Fayetteville* ☐ *Mooresville* ☐ *Raleigh* ☐ *Washington* ☐ *Wilmington* ☒ *Winston-Salem*

Facility Name: White Street Landfill		*Testing Company: SCS Engineers, PC*	
Facility Address/City/County: *P.O. Box 3136* *Greensboro, NC 27402-3136* *Guilford County* *NOTE: Contact not located at facility.*		*Testing Company Address:* *129 West Trade Street* *Suite 1630* *Charlotte, NC 28202*	
Contact Person: Greg Thomasson, P.E.		*Contact Person: Erin Conklin OR Steve Lamb, P.E.*	
Phone: (336) 373-4107	*Fax: (336) 373-2988*	*Phone: (478) 284-9392 OR (704) 377-4766*	*Fax: (919) 932-7577 OR (704) 377-4768*
Air Permit Number: 08830T01		*Permitted Source Name and ID No.: ES -1: Non-active portion of MSW landfill; ES-2: Non-active portion of MSW landfill; ES-3: Active portion of MSW landfill*	
Permitted Maximum Process Rate: *Not Applicable3*	*Maximum Normal Operation Process Rate:* *Not Applicable*	*Target Process Rate for Testing:* *Not Applicable*	

1.1) What is the specific purpose for the proposed testing?
Testing is proposed for five-year non-methane organic compound (NMOC) concentration calculations as specified in the New Source Performance Standards (NSPS), 40 CFR 60.754(a)(3).

1.2) List all state and federal regulations that apply to the proposed testing:
NSPS, 40 CFR Subpart WWW

1.3) Will the test results be used for other regulatory purposes (e.g., emission inventories, permit application, etc.) beyond that stated above, ☒ *Yes or* ☐ *No? If yes, explain.*
The NMOC concentration calculated from testing data could be used in calculations of actual fugitive emissions from the Landfill.

1.4) How will production/process data be documented during testing (control equipment, process parameters, etc.)?
Landfill gas samples will be collected using EPA Method 25C. These samples will then be analyzed for NMOC using EPA Method 25C and for nitrogen and oxygen using EPA Method 3C. See Attachment A, Tier 2 Sampling Protocol, for information to be included in the final test report.

1.5) Please provide a brief description of the source (including control equipment) and ***attach*** *source or process flow diagram:*
The sources consists of three phases, Phase I, which does not have a gas collection and control system (GCCS), Phase II, which does have a GCCS, and Phase III, which does have a GCCS. See Attachment B for the Process Flow Diagram.

1.6) Please provide a brief description of the sampling location, ***attach*** *schematic of sampling location, and indicate whether concurrent testing will be conducted at other sampling locations:*
See Attachment A, Tier 2 Sampling Protocol, for a description of the sampling locations in the three phases.

PROTOCOL SUBMITTAL FORM

DIVISION OF AIR QUALITY

2.1) *Please provide the following information for each test parameter.*

Target Pollutant	Proposed Test Method	Number of Test Runs	Test Run Duration	# of Sampling Points	Comments
NMOC	25C	NA	NA	13	Phase I Sampling. See Attachment A.
NMOC	25C	NA	NA	1	Phase II Sampling. See Attachment A.
NMOC	25C	NA	NA	6	Phase III Sampling. See Attachment A.

2.2) ***Will all testing be conducted in strict accordance with the applicable test methods?*** *If answer is no, please **attach** complete documentation of all modifications and/or deviations to the applicable test methods.*	☐ Yes	☒ No
2.3) *Does the proposed sampling location meet the minimum EPA Method 1 criteria for acceptable measurement sites? Please **attach** supporting documentation.*	☐ Yes	☐ No
2.4) *Has absence of cyclonic flow been verified per EPA Method 1 (Section 2.4)? If answer is no, absence of cyclonic flow must be verified prior to testing. If answer is yes, please **attach** supporting documentation.*	☐ Yes	☐ No
2.5) *Will the oxygen concentration be determined by ☐ EPA Method 3 via Orsat or ☐ strict EPA Method 3A?(specify) If answer is no, see Question 2.2 above.*	☐ Yes	☒ No
2.6) *Do any of the proposed test methods require analysis of EPA audit samples? If yes, notify Regional Office at least 45 days prior to testing to allow for audit sample preparation and shipment.*	☐ Yes	☒ No
2.7) *Has all testing equipment been calibrated within the past year? If answer is no, please explain.*	☒ Yes	☐ No
2.8a) *Have all calibration gases been certified by EPA Protocol 1 procedures? (Answer only as applicable)*	☐ Yes	☐ No
2.8b) *Is a dilution system (via EPA Method 205) proposed? (Answer only as applicable)*	☐ Yes	☐ No
*Please **attach** a summary of expected calibration gas concentrations for all proposed instrumental test methods.*		

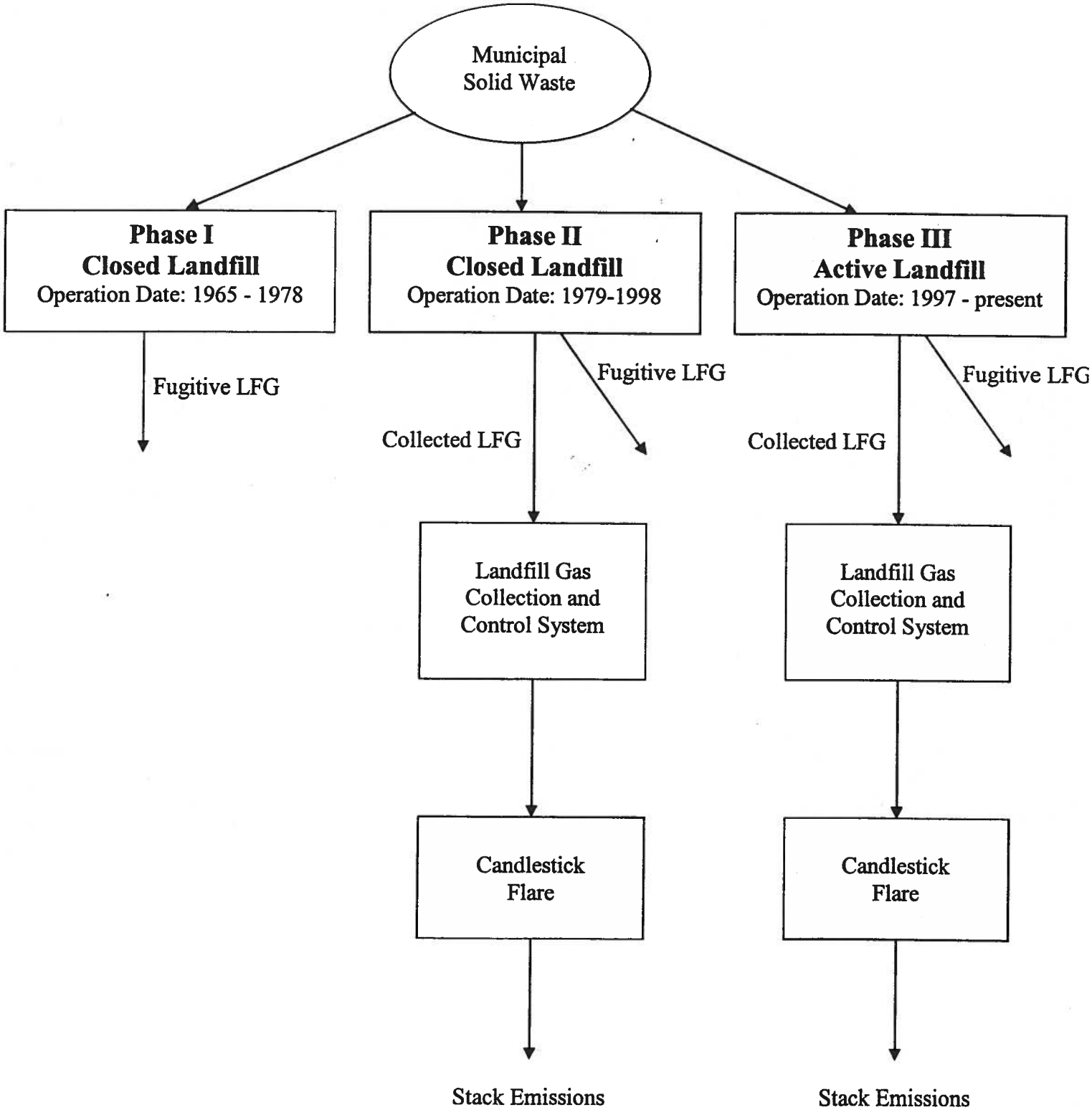
2.9) *What is the proposed test schedule?* ***The DAQ Regional Supervisor must be notified at least 15 days prior to the actual test date(s)***
Due to ongoing construction as described in Attachment A, the specific Tier 2 sampling date cannot be given. However, an approximat sampling timeframe is
June 2004.

Additional Comments: For additional clarification of sampling procedures, test methods, and reporting results, see Attachment A, Tier 2 Sampling Protocol.

*Signatures: Representatives from the permitted facility **and** the contracted testing company **must provide signatures** below certifying that the information provided on this form and any attached information is accurate and complete.*

_____ / _____	1 5/4/2003
Permitted Facility Representative — *Date*	*Testing Company Representative* — *Date*
Name: Greg Thomasson, P.E.	*Name:* Steve C. Lamb, P.E.
Title: Technical & Planning Support Manager	*Title:* Project Manager
Company: City of Greensboro	*Company:* SCS Engineers, PC

FLOW CHART


Municipal Solid Waste
Phase I
Closed Landfill
Operation Date: 1965 - 1978
Phase II
Closed Landfill
Operation Date: 1979-1998
Phase III
Active Landfill
Operation Date: 1997 - present
Fugitive LFG
Fugitive LFG
Fugitive LFG
Collected LFG
Collected LFG
Landfill Gas Collection and Control System
Landfill Gas Collection and Control System
Candlestick Flare
Candlestick Flare
Stack Emissions
Stack Emissions

DRAWN BY: SCL DATE: 5-4-04 FILE NAME: 02203314.00

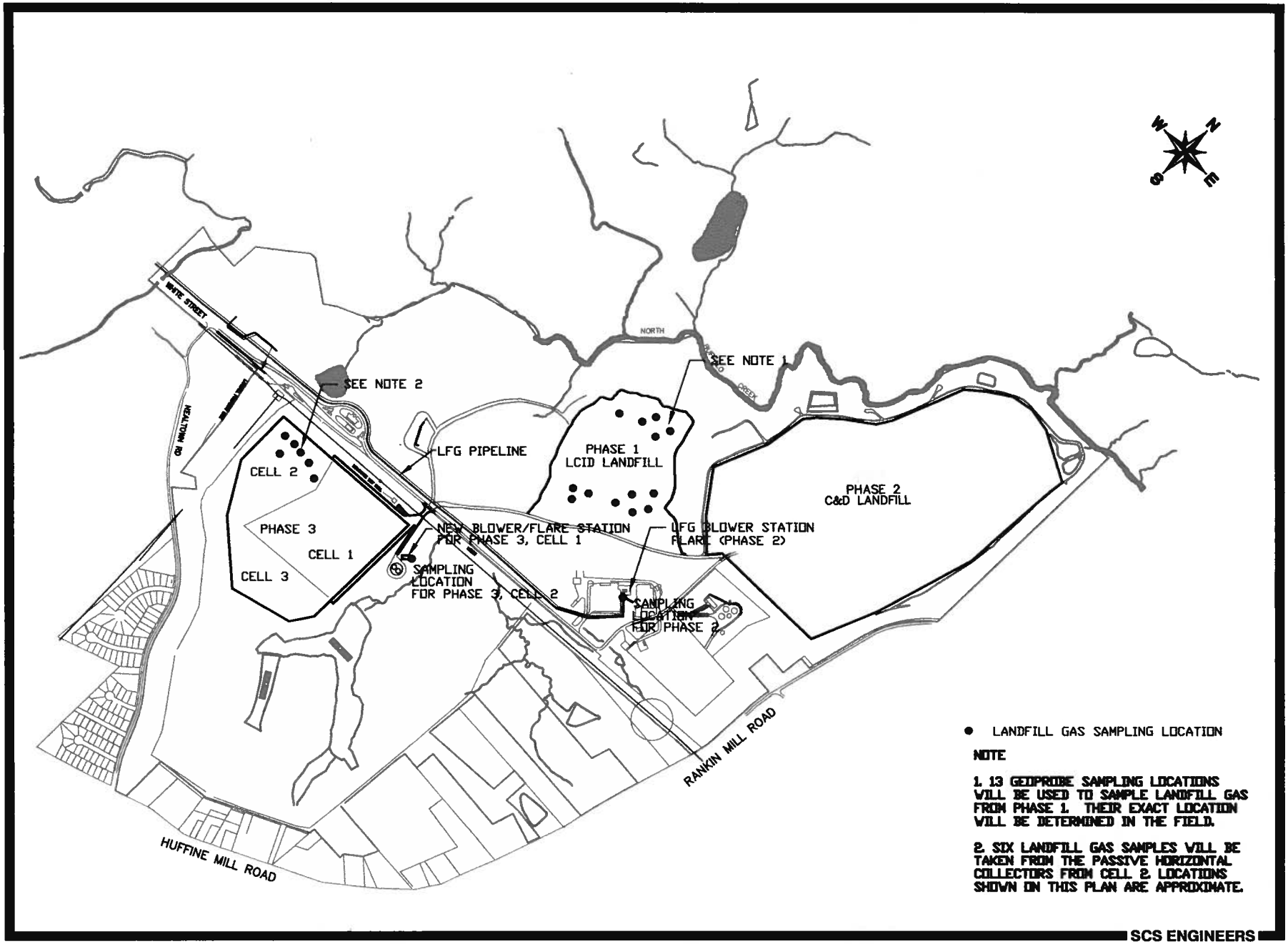


FIGURE 1. WHITE STREET LANDFILL SITE PLAN

APPENDIX B

NCDENR SAMPLING PROTOCOL APPROVAL LETTER

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Air Quality

Michael F. Easley, Governor

William G. Ross, Jr., Secretary
B. Keith Overcash, P.E., Director

Guilford County

May 20, 2004

Mr. Greg Thomasson, P.E.
Technical and Planning Support Manager
City of Greensboro
P.O. Box 3136
Greensboro, NC 27402-3136

Subject: City of Greensboro - White Street Landfill, Facility ID 04-41-01086
Greensboro, Guilford County, North Carolina, Air Permit 08830T01,
Protocol for 5-Year Nonmethane Organic Compounds (NMOC) Tier 2 Emissions Retest of the
NSPS Subpart WWW, Nonactive Portions of Landfill (ID Nos. ES-1 and ES-2) and
Active Portion of Landfill (ID No. ES-3), Phases I, II, and III
For a Revised Site-Specific NMOC Concentration and NMOC Emissions Rate
Submitted by SCS ENGINEERS, PC - Charlotte, NC
Proposed Test Date: First Week of June, 2004

Dear Mr. Thomasson:

The emissions test protocol for the subject landfill gas collection system has been reviewed. Testing will quantify the NMOC emissions for compliance with 40 CFR 60 Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills. The table below lists the pollutants and test methods:

Target Pollutant	Proposed Test Method
Carbon Dioxide and Oxygen	**USEPA Method 3C:** Determination of Carbon Dioxide, Methane, Nitrogen, and Oxygen from Stationary Sources (Sampling concurrent with USEPA Method 25C testing.)
NMOC	**USEPA Method 25C:** Determination of Nonmethane Organic Compounds (NMOC) in Landfill Gases (Sampling concurrent with USEPA Method 3C testing.) **ES-1 and ES-3 cell 2 will be sampled using composite equal volume sampling collected from 13 (ES-1) sample probes and 6 (ES-3 cell 2) passive horizontal gas collectors. ES-2 and ES-3 cell 1, sampling will require 3 separate sample collections from each common header test location.**

Note: Composite sampling will be conducted for ES-1 phase I and ES-3 phase III cell 2. When composite sampling, an equal volume must be collected from each of the sample probes. ES-2 phase II and ES-3 phase III cell 1 will each be sampled from a common header pipe location. A minimum of 3 separate samples should be collected at each common header test location.

Technical Services Section
1641 Mail Service Center, Raleigh, North Carolina 27699-1641
2728 Capital Blvd., Raleigh, North Carolina 27604
Phone: 919-733-1728 / FAX 919-733-1812 / Internet: www.ncair.org

The test protocol is approved. USEPA Region 4 has approved composite sampling from the six phase III cell 2 passive horizontal gas collectors, since this approach should provide sampling that is as representative as the two sampling probes per hectare requirement. Therefore, composite sampling from the phase III cell 2 passive horizontal gas collectors will be considered representative.

ES-1 phase I and ES-3 phase III cell 2 will be sampled using composite sampling with an equal volume of sample collected at each of the 13 ES-1 sample probes and from each of the ES-3 cell 2 sample probes (6 passive horizontal gas collectors). ES-2 and ES-3, phase II and phase III cell 1 respectively, will each be sampled at a common header pipe location since both of these phases have landfill gas collection systems. When emissions testing at a common header pipe location, a minimum of 3 separate samples should be collected at each common header test location.

White Street Landfill shall be responsible for ensuring, within the limits of practicality, that the landfill gas collection systems are operated at or near the maximum normal process rate. The final test report will include information to establish that the near maximum normal requirement was met during the test period.

The proposed methods are acceptable. Approval of the testing proposals does not exempt the tester, in any way, from the minimum requirements of the applicable test methods. Any deviations from the applicable methodologies remain subject to the approval of the Division of Air Quality and the USEPA. If there are any additional questions concerning this matter, please contact me at (919) 715-0251 or at Gregg.Oneal@ncmail.net.

Sincerely,

T. G. O'Neal, III

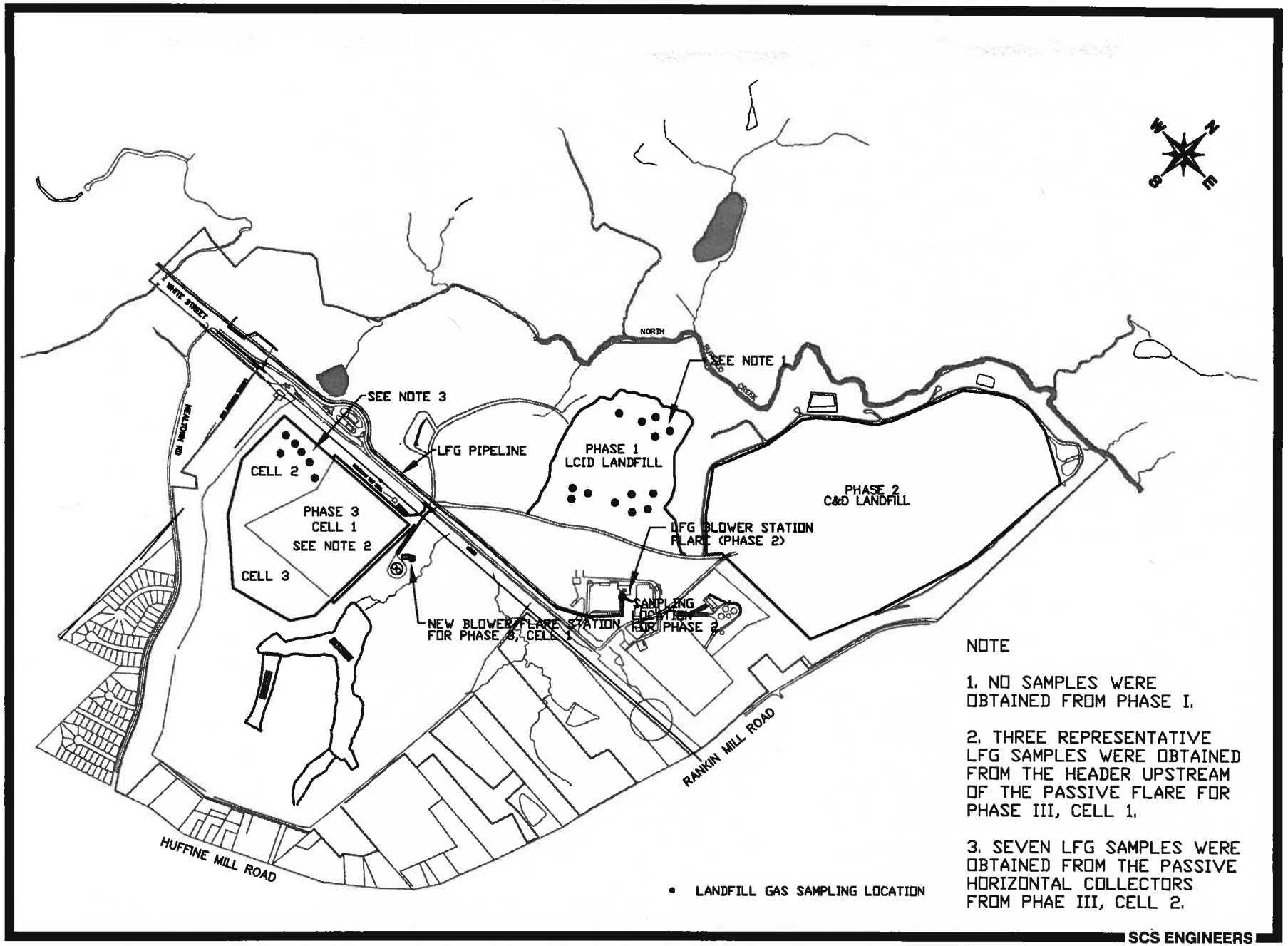
Thomas G. O'Neal, III, P.E.
Environmental Engineer

cc: Steven C. Lamb, P.E., SCS ENGINEERS, PC, File No. 02203314.00 - Charlotte, NC
Erin C. Conklin, SCS ENGINEERS, PC, File No. 02203314.00 - Charlotte, NC
David McNeal, USEPA REGION 4 - Atlanta, GA
Myron Whitley, Winston-Salem Regional Office
SSCB File via Michael Y. Aldridge
Central Files, Guilford County
IMPAQ - Documents - 4101086 (Filename: scs_0604.doc)

APPENDIX C

SITE MAP AND TIER 2 SAMPLING LOCATIONS

DRAWN BY: SCL DATE: 8-2-04 FILE NAME: 02203314.00



WHITE STREET LANDFILL SITE PLAN

APPENDIX D

TIER 2 SAMPLING LOGS AND ATMAA CHAIN OF CUSTODY FORMS

Tier 2 Sampling Logs

PROJECT/ PROJECT NO./CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
White Street Landfill Tier 2 Sampling - 02203314.00	City of Greensboro, NC Guilford County	15-Jun-04	Overcast; Humid Mid-70's	E. Conklin, SCS	Page 1 of 5

SUMMA CANISTER ID	WSL-061504-01	WSL-061504-02	WSL-061504-03	**PHASE II HEADER SAMPLES (3 Canisters)**	
CANISTER VOLUME (L)	6	6	6		
TOTAL CANISTER VACUUM (in Hg)	-19.9	-20.0	-20.1		
SAMPLE NO.	1	2	3	-----	-----
CANISTER VACUUM/VOL (in Hg/L)	5.0	5.0	5.0	-----	-----
AMBIENT TEMPERATURE (F)	72	76	75	-----	-----
BAROMETRIC PRESSURE (in Hg)	30.15	30.15	30.15	-----	-----
TIME: BEGIN PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE RATE (ml/min)	not applicable*	not applicable*	not applicable*	-----	-----
TIME: END PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE VOLUME (L)	not applicable*	not applicable*	not applicable*	-----	-----
GEM 500: % METHANE	51.6	52.5	52.2	-----	-----
GEM 500: % CO2	40.7	41.4	40.4	-----	-----
GEM 500: % O2	0.0	1.5	0.6	-----	-----
GEM 500: % NITROGEN (balance)	7.7	4.6	6.8	-----	-----
CANISTER VAC: INITIAL (in Hg)	-19.9	-20.0	-20.1	-----	-----
CANISTER VAC: FINAL (in Hg)	-4.9	-5.0	-5.1	-----	-----
TIME: BEGIN FILL	7:36 AM	8:00 AM	8:18 AM	-----	-----
SAMPLE FILL RATE (ml/min)	158	231	200	-----	-----
TIME: END FILL	7:55 AM	8:13 AM	8:33 AM	-----	-----
SAMPLE VOLUME (L)	3.0	3.0	3.0	-----	-----
PROBE DEPTH (FT)	not applicable*	not applicable*	not applicable*	-----	-----

* Not applicable due to sample being drawn from the LFG collection system header instead of sample probes.

PROJECT/ PROJECT NO./CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
White Street Landfill Tier 2 Sampling - 02203314.00	City of Greensboro, NC Guilford County	15-Jun-04	Overcast; Humid Upper-70's	E. Conklin, SCS	Page 2 of 5

SUMMA CANISTER ID	WSL-061504-04	WSL-061504-05	WSL-061504-06	**PHASE III, CELL 1 HEADER SAMPLES (3 Canisters)**	
CANISTER VOLUME (L)	6	6	6		
TOTAL CANISTER VACUUM (in Hg)	-20.3	-20.1			
SAMPLE NO.	4	5	6	-----	-----
CANISTER VACUUM/VOL (in Hg/L)	5.0	5.0	5.0	-----	-----
AMBIENT TEMPERATURE (F)	78	77	80	-----	-----
BAROMETRIC PRESSURE (in Hg)	30.15	30.15	30.15	-----	-----
TIME: BEGIN PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE RATE (ml/min)	not applicable*	not applicable*	not applicable*	-----	-----
TIME: END PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE VOLUME (L)	not applicable*	not applicable*	not applicable*	-----	-----
GEM 500: % METHANE	60.7	62.2	61.9	-----	-----
GEM 500: % CO2	39.3	37.8	38.1	-----	-----
GEM 500: % O2	0.0	0.0	0.0	-----	-----
GEM 500: % NITROGEN (balance)	0.0	0.0	0.0	-----	-----
CANISTER VAC: INITIAL (in Hg)	-20.3	-20.1	-20.3	-----	-----
CANISTER VAC: FINAL (in Hg)	-5.3	-5.1	-5.3	-----	-----
TIME: BEGIN FILL	9:13 AM	9:38 AM	10:00 AM	-----	-----
SAMPLE FILL RATE (ml/min)	250	214	273	-----	-----
TIME: END FILL	9:25 AM	9:52 AM	10:11 AM	-----	-----
SAMPLE VOLUME (L)	3.0	3.0	3.0	-----	-----
PROBE DEPTH (FT)	not applicable*	not applicable*	not applicable*	-----	-----

* Not applicable due to sample being drawn from the LFG collection system header instead of sample probes.

PROJECT/ PROJECT NO./CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
White Street Landfill Tier 2 Sampling - 02203314.00	City of Greensboro, NC Guilford County	15-Jun-04	Overcast; Humid Lower 80's	E. Conklin, SCS	Page 3 of 5

PHASE III, CELL 2 HORIZONTAL COLLECTOR SAMPLES
(3 HC SAMPLES COMPOSITED INTO 1 CANISTER)

SUMMA CANISTER ID	WSL-061504-07				
CANISTER VOLUME (L)	6				
TOTAL CANISTER VACUUM (in Hg)	-20.0				
SAMPLE NO.	7	8	9	-----	-----
CANISTER VACUUM/VOL (in Hg/L)	5.0	5.0	5.0	-----	-----
AMBIENT TEMPERATURE (F)	77	81	84	-----	-----
BAROMETRIC PRESSURE (in Hg)	30.15	30.15	30.15	-----	-----
TIME: BEGIN PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE RATE (ml/min)	not applicable*	not applicable*	not applicable*	-----	-----
TIME: END PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE VOLUME (L)	not applicable*	not applicable*	not applicable*	-----	-----
GEM 500: % METHANE	57.6	56.6	58.0	-----	-----
GEM 500: % CO2	42.4	43.4	42.0	-----	-----
GEM 500: % O2	0.0	0.0	0.0	-----	-----
GEM 500: % NITROGEN (balance)	0.0	0.0	0.0	-----	-----
CANISTER VAC: INITIAL (in Hg)	-20.0	-15.0	-10.0	-----	-----
CANISTER VAC: FINAL (in Hg)	-15.0	-10.0	-5.0	-----	-----
TIME: BEGIN FILL	10:29 AM	10:38 AM	10:48 AM	-----	-----
SAMPLE FILL RATE (ml/min)	250	250	167	-----	-----
TIME: END FILL	10:33 AM	10:42 AM	10:54 AM	-----	-----
SAMPLE VOLUME (L)	1.0	1.0	1.0	-----	-----
PROBE DEPTH (FT)	not applicable*	not applicable*	not applicable*	-----	-----

* Not applicable due to sample being drawn from the LFG collection system horizontal collectors instead of sample probes.

PROJECT/ PROJECT NO./CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
White Street Landfill Tier 2 Sampling - 02203314.00	City of Greensboro, NC Guilford County	15-Jun-04	Partly Sunny Mid 80's	E. Conklin, SCS	Page 4 of 5

PHASE III, CELL 2 HORIZONTAL COLLECTOR SAMPLES
(3 HC SAMPLES COMPOSITED INTO 1 CANISTER)

SUMMA CANISTER ID	WSL-061504-08				
CANISTER VOLUME (L)	6				
TOTAL CANISTER VACUUM (in Hg)	-20.7				
SAMPLE NO.	10	11	12	-----	-----
CANISTER VACUUM/VOL (in Hg/L)	5.0	5.0	5.0	-----	-----
AMBIENT TEMPERATURE (F)	87	90	88	-----	-----
BAROMETRIC PRESSURE (in Hg)	30.15	30.15	30.15	-----	-----
TIME: BEGIN PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE RATE (ml/min)	not applicable*	not applicable*	not applicable*	-----	-----
TIME: END PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE VOLUME (L)	not applicable*	not applicable*	not applicable*	-----	-----
GEM 500: % METHANE	62.3	59.6	55.6	-----	-----
GEM 500: % CO2	37.7	40.4	44.4	-----	-----
GEM 500: % O2	0.0	0.0	0.0	-----	-----
GEM 500: % NITROGEN (balance)	0.0	0.0	0.0	-----	-----
CANISTER VAC: INITIAL (in Hg)	-20.7	-15.7	-10.6	-----	-----
CANISTER VAC: FINAL (in Hg)	-15.7	-10.7	-5.6	-----	-----
TIME: BEGIN FILL	11:11 AM	11:18 AM	11:28 AM	-----	-----
SAMPLE FILL RATE (ml/min)	250	200	167	-----	-----
TIME: END FILL	11:15 AM	11:23 AM	11:34 AM	-----	-----
SAMPLE VOLUME (L)	1.0	1.0	1.0	-----	-----
PROBE DEPTH (FT)	not applicable*	not applicable*	not applicable*	-----	-----

* Not applicable due to sample being drawn from the LFG collection system horizontal collectors instead of sample probes.

PROJECT/ PROJECT NO./CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
White Street Landfill Tier 2 Sampling - 02203314.00	City of Greensboro, NC Guilford County	15-Jun-04	Partly Sunny Mid 80's	E. Conklin, SCS	Page 5 of 5

PHASE III, CELL 2 HORIZONTAL COLLECTOR SAMPLES
(3 HC SAMPLES COMPOSITED INTO 1 CANISTER)

SUMMA CANISTER ID	WSL-061504-09				
CANISTER VOLUME (L)	6				
TOTAL CANISTER VACUUM (in Hg)	-20.4				
SAMPLE NO.	13			-----	-----
CANISTER VACUUM/VOL (in Hg/L)	5.0			-----	-----
AMBIENT TEMPERATURE (F)	84			-----	-----
BAROMETRIC PRESSURE (in Hg)	30.15			-----	-----
TIME: BEGIN PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE RATE (ml/min)	not applicable*	not applicable*	not applicable*	-----	-----
TIME: END PURGE	not applicable*	not applicable*	not applicable*	-----	-----
PURGE VOLUME (L)	not applicable*	not applicable*	not applicable*	-----	-----
GEM 500: % METHANE	52.9			-----	-----
GEM 500: % CO2	47.1			-----	-----
GEM 500: % O2	0.0			-----	-----
GEM 500: % NITROGEN (balance)	0.0			-----	-----
CANISTER VAC: INITIAL (in Hg)	-20.4			-----	-----
CANISTER VAC: FINAL (in Hg)	-15.4			-----	-----
TIME: BEGIN FILL	11:51 AM			-----	-----
SAMPLE FILL RATE (ml/min)	200			-----	-----
TIME: END FILL	11:56 AM			-----	-----
SAMPLE VOLUME (L)	1.0	1.0	1.0	-----	-----
PROBE DEPTH (FT)	not applicable*	not applicable*	not applicable*	-----	-----

* Not applicable due to sample being drawn from the LFG collection system horizontal collectors instead of sample probes.

AtmAA Chain of Custody Forms

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of Greensboro / White Street Landfill	Greensboro, North Carolina
Project No. 02203314.00	**Field Logbook No.**
Sampler: (Signature) Erin Conklin Erin Conklin	**Chain of Custody Tape No.**

Sample No./ Identification	Type of Sample	AtmAA Lab Number	Sampling Date	Sampling Time	Method 25C (NMOC)	Method 3C (O_2 & N_2)					Sample Temp / Barometric Press. / Atmospheric Temp. Special Remarks
WSL-061504-01	Vapor	01684-6	6/15/04	7:30 AM	✓	✓					74°F 30.15 in Hg 72°F
WSL-061504-02	Vapor	-7	6/15/04	8:00 AM	✓	✓					74°F 30.15 in Hg 76°F
WSL-061504-03	Vapor	-8	6/15/04	8:15AM	✓	✓					74°F 30.15 in Hg 75°F
WSL-061504-04	Vapor	-9	6/15/04	9:15AM	✓	✓					78°F

ANALYSES REQUESTED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Erin Conklin Erin Conklin	6/15/04	12:15 pm			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time
				6/16/04	1100

Sample Collector Info

Company: SCS Engineers, PC
Street Address: 129 W. Trade Street, Ste. 1630
City/State/Zip: Charlotte, NC 28202
Telephone No.: 478-284-9392
Fax No.: 704-377-4768

Analytical Laboratory

AtmAA Inc.
23917 Craftsman Rd.
Calabasas, CA 91302
TEL: (818) 223-3277
FAX: (818) 223-8250

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of Greensboro / White Street Landfill	Greensboro, North Carolina
Project No. 02203314.00	**Field Logbook No.**
Sampler: (Signature) Erin Conklin Erin Conklin	**Chain of Custody Tape No.**

Sample No./ Identification	Type of Sample	AtmAA Lab Number	Sampling Date	Sampling Time	Method 25c (NMOC)	Method 3c (O_2 & N_2)	Methane Analysis (CH4)				Sample Temp / Barometric Press / Atmospheric Temp. Special Remarks
WSL-061504-05	Vapor	01684-10	6/15/04	9:30 AM	✓	✓	✓				30.15 in Hg 78°F
WSL-061504-06	Vapor	-11	6/15/04	10:00 AM	✓	✓	✓				30.15 in Hg 77°F
WSL-061504-07	Vapor	-12	6/15/04	10:30 AM	✓	✓	✓				30.15 in Hg 80°F
WSL-061504-08	Vapor	-13	6/15/04	11:15 AM	✓	✓	✓				30.15 in Hg 81°F

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Erin Conklin Erin Conklin	6/15/04	12:15PM			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time
				6/16/04	1100

Sample Collector Info

Company: SCS Engineers, PC
Street Address: 129 W Trade Street, Ste. 1630
City/State/Zip: Charlotte, NC 28202
Telephone No.: 478-284-9392
Fax No.: 704-377-4768

Analytical Laboratory

AtmAA Inc.
23917 Craftsman Rd.
Calabasas, CA 91302
TEL: (818) 223-3277
FAX: (818) 223-8250

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of Greensboro / White Street Landfill	Greensboro, North Carolina
Project No. 02203314.00	**Field Logbook No.**
Sampler: (Signature) Erin Conklin Erin Conklin	**Chain of Custody Tape No.**

Sample No./ Identification	Type of Sample	AtmAA Lab Number	Sampling Date	Sampling Time	ANALYSES REQUESTED: Method 25C (NMOC)	Method 3C (O_2 & N_2)					Special Remarks: Sample Temp / Barometric Press / Atmospheric Temp.
WSL-061504-09	Vapor	01684-14	6/15/04	11:50AM	✓	✓					30.15 in Hg 84°F

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Erin Conklin Erin Conklin	6/15/04	12:15 PM			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time
				6/16/04	1100

Sample Collector Info

Company: SCS Engineers, PC
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APPENDIX E

ATMAA LABORATORY REPORT

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

June 30, 2004 LTR/350/04

Erin Conklin
SCS Engineers
222 Old Fayetteville Rd., Suite K102
Camboro, NC 27510

re: White Street Landfill

Dear Erin:

Please find enclosed the laboratory analysis report, data package, and the original chain of custody forms for a total of nine SUMMA canister samples received June 16, 2004.

The samples were analyzed according to EPA Method 25C and EPA Method 3C, for TGNMO, nitrogen, and oxygen.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/bwf

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO), Nitrogen, and Oxygen
Analysis in SUMMA Canister Samples

Report Date: June 30, 2004
Client: SCS Engineers
Site: White Street Landfill
Project No.: 02203314.00
Date Received: June 16, 2004
Date Analyzed: June 17, 18, 21, & 22, 2004
Instrumental Operator: Michael S. Porter

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25C. Nitrogen and oxygen were measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3C.

AtmAA Lab No.	Sample ID	Oxygen (%,v)	Nitrogen (%,v)	TGNMO (ppmv)
01684-6	wsl-061504-01	0.12	8.59	3993
01684-7	wsl-061504-02	0.17	8.30	3937
01684-8	wsl-061504-03	<0.1	7.79	4210
01684-9	wsl-061504-04	0.30	1.17	7696
01684-10	wsl-061504-05	0.12	0.71	7825
01684-11	wsl-061504-06	<0.1	0.56	8004
01684-12	wsl-061504-07	0.12	0.82	3433
01684-13	wsl-061504-08	0.81	3.31	4731
01684-14	wsl-061504-09	0.43	4.02	2407

TGNMO is total gaseous non-methane organics measured and reported as ppm methane. The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.

Note: Site barometric pressures and site temperatures which were recorded on the submitted chain of custody, were used in the concentration calculations.

Michael L. Porter
Laboratory Director

Date: June 30, 2004

AtmAA, Inc.

Laboratory Analysis Data Package

Client:	SCS Engineers
Project No.:	02203314.00
Site:	White Street Landfill, Greensboro, NC
Date Received:	June 16, 2004
Date Analyzed:	June 17, 18, 21, & 22, 2004
Lab No.:	01684-(6-14)

Client	SCS Engineers
Site	White Street Landfill
Project #:	02203314.00
Report Date	June 30, 2004
Date Received	June 16, 2004
Date Analyzed	June 17, 18, 21, & 22, 2004

	Lab #	ID	Can #	P1	P2	Pvac	Pb	(°F) LFG Temp	(°C) LFG Temp	Vapor Pressure
1	01684-6	wsl-061504-01	368	373	820	3	30.15	72	22.22222	20.09454
2	01684-7	wsl-061504-02	296	372	820	3	30.15	76	24.44444	22.98062
3	01684-8	wsl-061504-03	399	375	820	3	30.15	75	23.88889	22.22719
4	01684-9	wsl-061504-04	379	365	820	3	30.15	78	25.55556	24.55448
5	01684-10	wsl-061504-05	284	373	820	3	30.15	78	25.55556	24.55448
6	01684-11	wsl-061504-06	332	368	820	3	30.15	77	25	23.7562
7	01684-12	wsl-061504-07	102	406	820	3	30.15	80	26.66667	26.22137
8	01684-13	wsl-061504-08	367	369	820	3	30.15	81	27.22222	27.09113
9	01684-14	wsl-061504-09	286	131	820	3	30.15	84	28.88889	29.85274

sample ID

Client:	SCS Engineers				sample ID	co2 bkg					
Site	White Street Landfill				01684-6	12616					
Project #:	02203314.00				01684-7	12603					
Report Date	June 30, 2004				01684-8	16119					
Date Received	June 16, 2004				01684-9	17272					
Date Analyzed	June 17, 18, 21, & 22, 2004				01684-10	17205					
			n2 bkg		01684-11	12596					
rf from 6/02/04 3 pt calibration			5196		01684-12	11646					
	0.0006661				01684-13	10971					
N_2 BKG			% Diff from		01684-14	11262					
			3 point calib								
initial std	*230281*	*0.000695*	*4.32*								
end std	*228588*	*0.0007*	*5.11*								
							TGNMO				
Lab #	ID#	Can #	P1	P2	Dil	area	**conc**	MD	RMD(%)		
01684-6	wsl-061504-01	368	373	820	20	131982	**1590**	3.217		4.550	(STDEV)
					20	131499	**1584**	3.217			
					20						
						(mean)	1587	3.217	0.203		
01684-7	wsl-061504-02	296	372	820	20	129345	**1555**	1.765		2.496	(STDEV)
					20	129610	**1559**	1.765			
					20						
						(mean)	1557	1.765	0.113		
01684-8	wsl-061504-03	399	375	820	20	141638	**1672**	18.531		26.207	(STDEV)
					20	144420	**1709**	18.531			
					20						
						(mean)	1691	18.531	1.096		
01684-9	wsl-061504-04	379	365	820	20	259130	**3222**	2.358		3.335	(STDEV)
					20	258776	**3217**	2.358			
					20						
						(mean)	3220	2.358	0.073		

01684-10	wsl-061504-05	284	373	820	20	264164	**3290**	71.719		101.426	(STDEV)
					20	274931	**3433**	71.719			
					20						
							3362	71.719	2.133		
01684-11	wsl-061504-06	332	368	820	20	259357	**3287**	114.896		162.487	(STDEV)
					20	276606	**3517**	114.896			
					20						
						(mean)	3402	114.896	3.377		
01684-12	wsl-061504-07	102	406	820	20	128335	**1555**	45.242		63.981	(STDEV)
					20	135127	**1645**	45.242			
					20						
						(mean)	1600	45.242	2.828		
01684-13	wsl-061504-08	367	369	820	20	153726	**1902**	45.301		64.066	(STDEV)
					20	160527	**1992**	45.301			
					20						
						(mean)	1947	45.301	2.327		
01684-14	wsl-061504-09	286	131	820	20	37826	**354**	11.870		16.787	(STDEV)
					20	36044	**330**	11.870			
					20						
						(mean)	342	11.870	3.471		

Lab#	ID#	Can #	Tank Pressure after sampling P_t	Tank Temperature after pressurization T_{tf}	Tank Pressure after pressurization P_{tf}	*Tank Temperature after sampling* T_t	*Tank Pressure after evacuation* P_{ti}	*Tank Temperature before sampling* T_{ti}	*Vapor Pressure of water* P_w
01684-6	wsl-061504-01	368	373	298	820	298	3	298	20.09453541
01684-7	wsl-061504-02	296	372	298	820	298	3	298	22.98061623
01684-8	wsl-061504-03	399	375	298	820	298	3	298	22.22718936
01684-9	wsl-061504-04	379	365	298	820	298	3	298	24.55447787
01684-10	wsl-061504-05	284	373	298	820	298	3	298	24.55447787
01684-11	wsl-061504-06	332	368	298	820	298	3	298	23.75619728
01684-12	wsl-061504-07	102	406	298	820	298	3	298	26.22137213
01684-13	wsl-061504-08	367	369	298	820	298	3	298	27.0911299
01684-14	wsl-061504-09	286	131	298	820	298	3	298	29.85274083

Barometric Pressure P_b	Water Correction B_w	Number of analysis r	Measured N_2 Fraction C_{N2}	Measured NMOC conc C_{tm}	**Calculated NMOC conc** C_t	Lab#	ID#		TGNMO conc w/o formula
765.81	0.026239583	2	0.085921995	1590.2	**3993.173705**	01684-6	wsl-061504-01		3488.796
				1583.8					
				0.0					
765.81	0.030008248	2	0.083046858	1555.2	**3936.897804**	01684-7	wsl-061504-02		3432.101
				1558.8					
				0.0					
765.81	0.029024418	2	0.077935297	1672.2	**4209.99922**	01684-8	wsl-061504-03		3696.986
				1709.2					
				0.0					
765.81	0.032063407	2	0.011655494	3222.0	**7696.085349**	01684-9	wsl-061504-04		7233.241
				3217.3					
				0.0					
765.81	0.032063407	2	0.007134199	3290.0	**7824.516185**	01684-10	wsl-061504-05		7390.347
				3433.4					
				0.0					
765.81	0.031021007	2	0.005645643	3287.4	**8003.716113**	01684-11	wsl-061504-06		7581.091
				3517.1					
				0.0					
765.81	0.034240049	2	0.008244733	1554.5	**3432.59637**	01684-12	wsl-061504-07		3231.067
				1645.0					
				0.0					
765.81	0.035375785	2	0.033121794	1901.8	**4731.476859**	01684-13	wsl-061504-08		4326.852
				1992.4					
				0.0					
765.81	0.038981916	2	0.040151345	353.9	**2406.798243**	01684-14	wsl-061504-09		2140.903
				330.2					
				0.0					

Duplicate Analyses Results
(Without Method 25C formula)

Site	White Street Landfill		
Report Date	June 30, 2004		
Date Analyzed	June 17, 18, 21, & 22, 2004		
Date Received	June 16, 2004		
AtmAA	Sample	**Measured**	
Lab #	ID#	**conc (ppm)**	
01684-6	wsl-061504-01	**3496**	Run #1
		3482	Run #2
		---	Run #3
01684-7	wsl-061504-02	**3428**	Run #1
		3436	Run #2
		---	Run #3
01684-8	wsl-061504-03	**3656**	Run #1
		3738	Run #2
		---	Run #3
01684-9	wsl-061504-04	**7239**	Run #1
		7228	Run #2
		---	Run #3
01684-10	wsl-061504-05	**7233**	Run #1
		7548	Run #2
		---	Run #3
01684-11	wsl-061504-06	**7325**	Run #1
		7837	Run #2
		---	Run #3
01684-12	wsl-061504-07	**3140**	Run #1
		3322	Run #2
		---	Run #3
01684-13	wsl-061504-08	**4226**	Run #1
		4428	Run #2
		---	Run #3
01684-14	wsl-061504-09	**2215**	Run #1
		2067	Run #2
		---	Run #3

Oxidation and Reduction Catalysts Efficiency Report

June 17, 18, 21, & 22, 2004
Catalyst Efficiencies for
TCA 2

	std conc	Cr in Ni in response	Cr in Ni out response	(oxidation) Chromium	instrument resp factor	(reduction) Nickel
	(ppmv)			(% efficiency)		(% efficiency)
CO	102	145109	0	**100**	0.0007029	**98.1**
CH4	97.9	141994	0	**100.0**	0.0006895	**100.0**
CO2	401	580862	0	**100**	0.0006904	**99.9**
TGNMO	156.4	230281	0	**100.0**	0.0006792	**101.5**

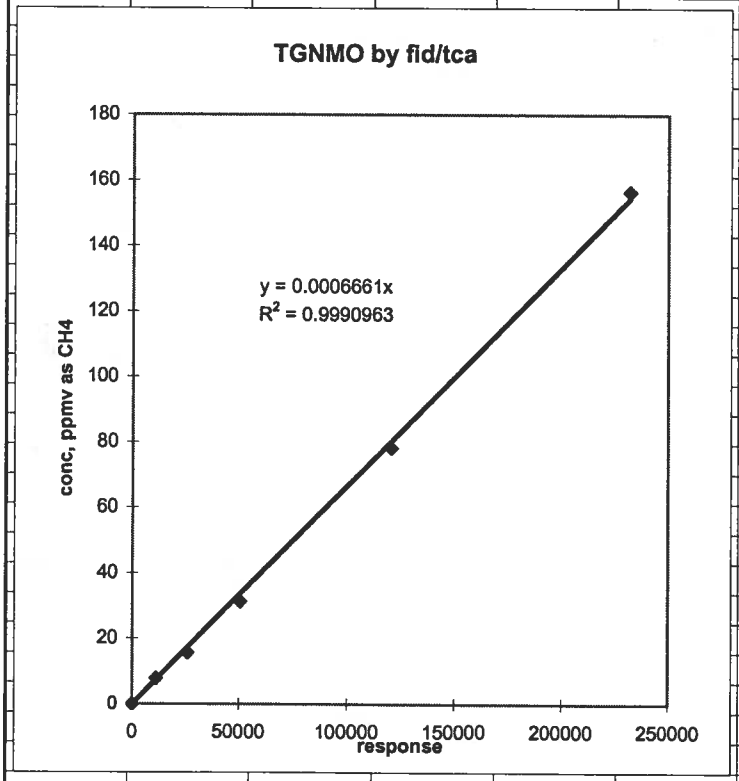
Oxidation and Reduction Catalysts Efficiency Report

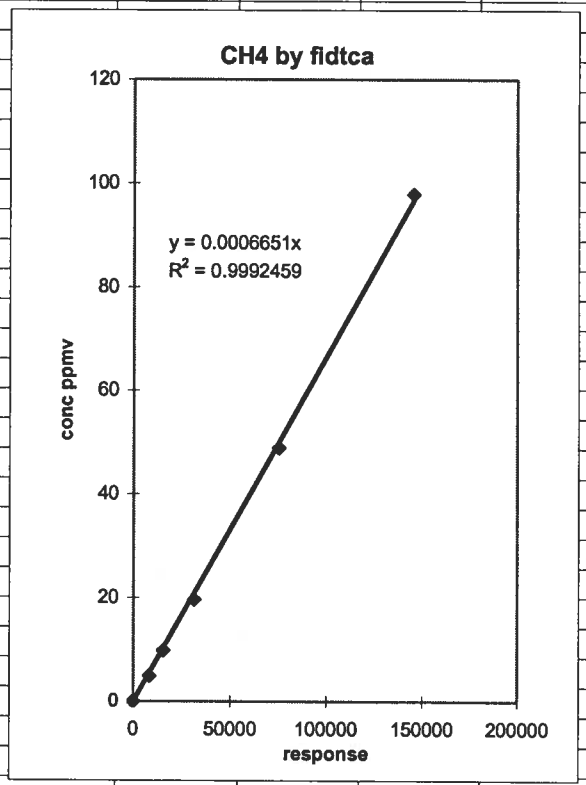
Instrument	Date	Oxidation Catalyst Efficiency (Converting TGNMO to CO_2) (%)	Reduction Catalyst Efficiency (Converting CO_2 to CH_4) (%)
TCA 2	7, 18, 21, & 22, 2004	100.0	100

TGNMO is total gaseous non- methane organics.

white st. 25c report

6/2/2004		n2 bkg	6649	4898	4833	2000				
tca1	chart									
		cc86303		20x		10x		5x		2x
co	147429	102	8839	5.1	16211	10.2	32662	20.4	76834	51
ch4	145660	97.9	8376	4.895	15587	9.79	31614	19.58	75355	48.95
co2	597883	401	36914	20.05	67069	40.1	133998	80.2	311755	200.5
tgnmo	238767	156.4	16152	7.82	28031	15.64	57159	31.28	127210	78.2
c2	112214	80.4	6888	4.02	12107	8.04	24513	16.08	58539	40.2
		ff13841		2x						
co										
ch4		4.08		2.04						
co2										
tgnmo		3.12		1.56						
c2		3.66		1.83						
tgnmo	0	ch4								
0	0	0	0							
0	0	0	0							
0	0	0	0							
11319	7.82	8376	4.895							
26031	15.64	15587	9.79							
50510	31.28	31614	19.58							
120561	78.2	75355	48.95							
232118	156.4	145660	97.9							





Catalyst Check

Cr in
Ni out

CC 860303

04/06/17 14:53:12

3.144

WARNING NO PEAK

CC860303

04/06/17 15:08:42

1.281
1.709
3.164
6.765
7.691

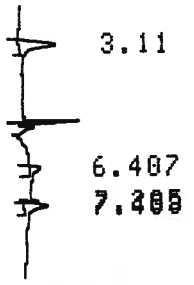
CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.281	1	145109	H R	1	100.8073	CO
2	1.709	1.334	141994	H	2	101.1283	CH4
3	3.164	2.4696	580862		3	365.32	CO2
4	6.765	5.2794	230281	S	4	159.3578	TGNMO
5	7.691	6.0023	107563	T	4	74.4352	TGNMO
		TOTAL	1205809			801.0486	

04/06/17 15:22:09

223.00037-01

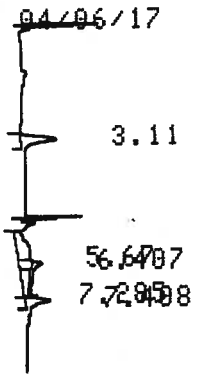
Shimadzu



CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	3.11	1521		3	0.9567	CO2
2	6.407	339		4	0.2348	TGNMO
3	7.285	92		4	0.0634	TGNMO
4	7.408	799		4	0.5527	TGNMO
	TOTAL	2751			1.8077	

N_2 bkg.

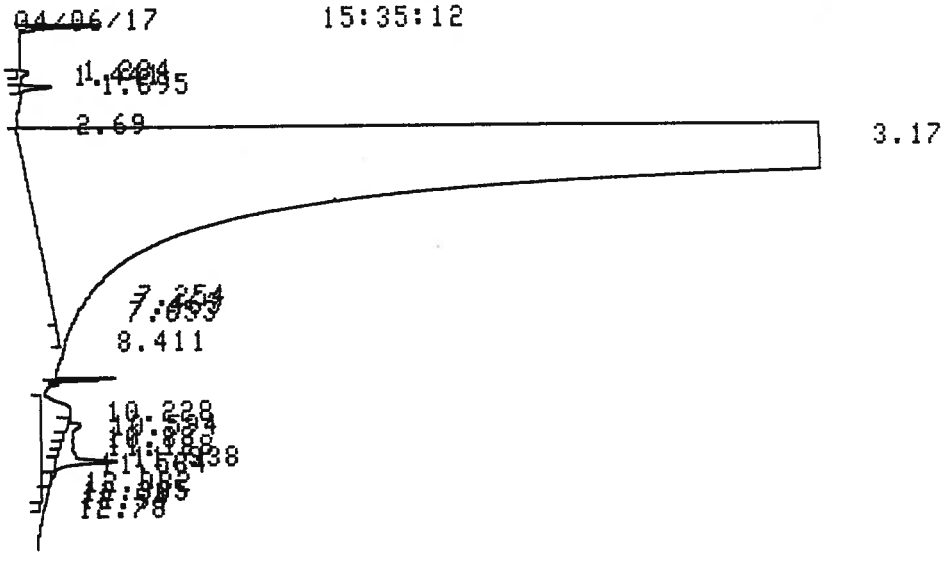


PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	3.11	1521		3	0.9567	CO2
2	5.67	3499	S	4	2.4213	TGNMO
3	6.407	371	T	4	0.2566	TGNMO
4	7.285	548	TV	4	0.3795	TGNMO
5	7.408	778	T	4	0.5385	TGNMO
	TOTAL	6717			4.5526	

5%

20144.

2.10%/washing



CHROMATOGRAM 1 MEMORIZED

011 223-02037-01

Shimadzu

TOTAL 24422680 16385.8261

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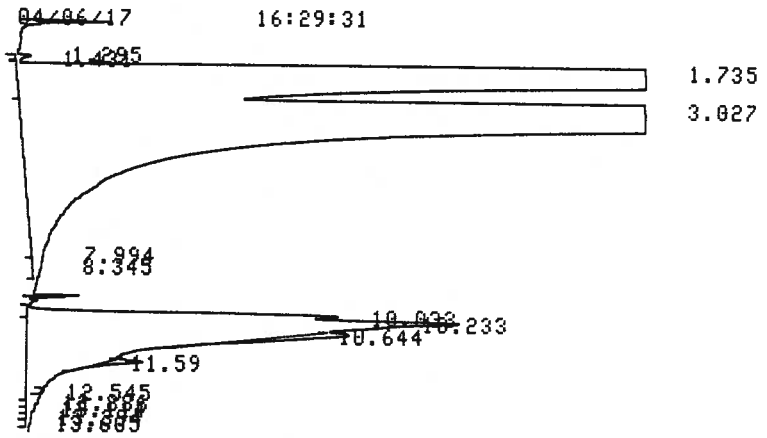


CHROMATOGRAM 1 MEMORIZED

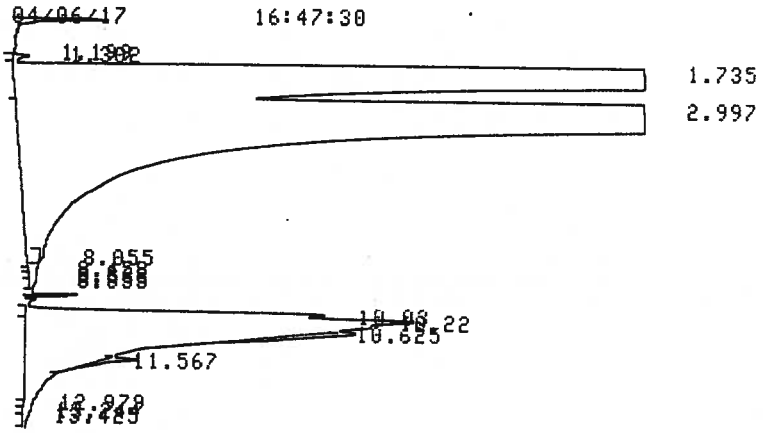
PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.295	1	457	R	1	0.3173	CO
2	1.735	1.3398	13008035	VE	2	9262.1884	CH4
3	3.027	2.3377	13794676	SVE	3	8675.6083	CO2
4	8.345	6.444	987	V	4	0.6833	TGNMO
5	10.033	7.7475	16765		4	11.6122	TGNMO
6	10.233	7.9022	107772	SV	4	74.6484	TGNMO
7	10.644	8.2193	4607	T	4	3.1911	TGNMO
8	11.59	8.9498	1613	T	4	1.1175	TGNMO
9	12.545	9.6875	61	T	4	0.0424	TGNMO
10	12.886	9.9503	523	V	4	0.3624	TGNMO
11	13.114	10.1266	325	V	4	0.2248	TGNMO
12	13.394	10.3429	214	V	4	0.1484	TGNMO
13	13.605	10.5058	102	V	4	0.0709	TGNMO
		TOTAL	26936120			18030.205	

013 223.020037

13.1, 9Z-2

−6 ×20

X



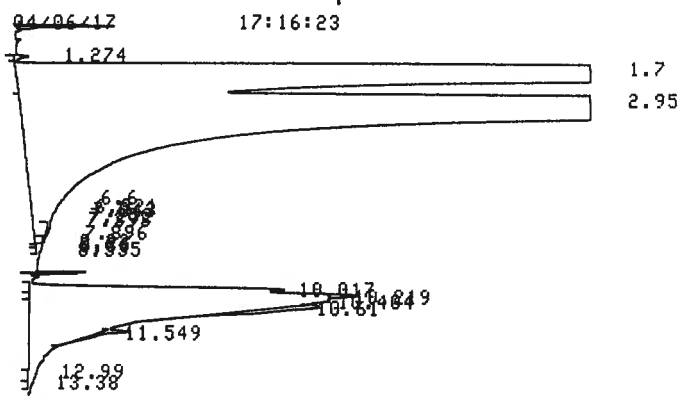
CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.302	1	531	R	1	0.3692	CO
2	1.735	1.3329	13151201	VE	2	9364.1279	CH4
3	2.997	2.3024	14198248	SVE	3	8929.4189	CO2
4	8.855	6.1885	227	T	4	0.1569	TGNMO
5	8.458	6.4981	314	V	4	0.2174	TGNMO
6	8.663	6.6553	303	V	4	0.21	TGNMO
7	8.855	6.8028	218	V	4	0.151	TGNMO
8	10.03	7.7052	16875		4	11.6882	TGNMO
9	10.22	7.8515	107697	SV	4	74.5961	TGNMO
10	10.625	8.1629	4078	T	4	2.8249	TGNMO
11	11.567	8.8866	1830	T	4	1.2672	TGNMO
12	12.979	9.9713	463	V	4	0.3206	TGNMO
13	13.244	10.1746	349	V	4	0.2418	TGNMO
14	13.425	10.3134	207	V	4	0.1437	TGNMO
		TOTAL	27482524			18385.7246	

13/499

⊕ Shimadzu

-7 ×20



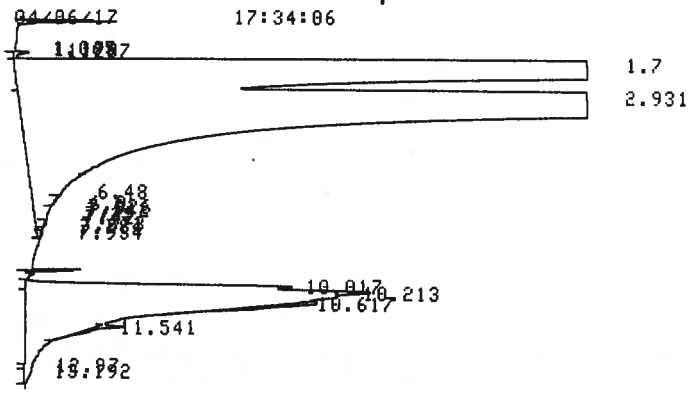
014 223.02037.01

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.274	1	424	R	1	0.2942	CO
2	1.7	1.3347	12801592	E	2	9115.1933	CH4
3	2.95	2.3161	13358214	SVE	3	8401.1132	CO2
4	7.896	6.1994	303	T	4	0.2101	TGNMO
5	8.23	6.4614	77	TV	4	0.0537	TGNMO
6	8.36	6.5635	150	V	4	0.1042	TGNMO
7	8.535	6.7014	173	V	4	0.1196	TGNMO
8	10.017	7.8647	14696		4	10.1789	TGNMO
9	10.219	8.0236	25525	V	4	17.68	TGNMO
10	10.404	8.1688	82123	SV	4	56.8826	TGNMO
11	10.61	8.3303	4521	T	4	3.1315	TGNMO
12	11.549	9.0678	1660	T	4	1.1499	TGNMO
13	12.99	10.1989	655	V	4	0.4535	TGNMO
14	13.38	10.5054	165	V	4	0.114	TGNMO
		TOTAL	26290266			17606.6679	

129345

-7. ×20

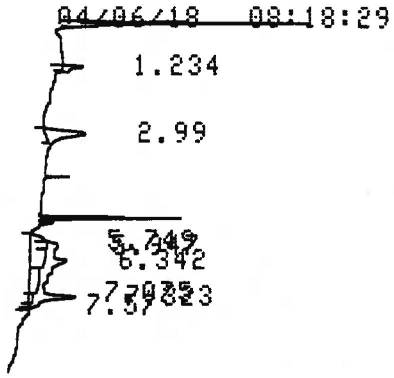


CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.267	1	496	V R	1	0.3446	CO
2	1.7	1.3414	12996088	E	2	9253.6816	CH4
3	2.931	2.3127	13723784	SVE	3	8631.0244	CO2
4	6.9	5.4442	63	TV	4	0.0439	TGNMO
5	7.673	6.0544	69	TV	4	0.0478	TGNMO
6	7.934	6.2607	121	TV	4	0.0836	TGNMO
7	10.017	7.9037	15257		4	10.5678	TGNMO
8	10.213	8.0589	108205	SV	4	74.948	TGNMO
9	10.617	8.3777	3425	T	4	2.3723	TGNMO
10	11.541	9.1068	1788	T	4	1.2383	TGNMO
11	12.97	10.2341	367	V	4	0.2543	TGNMO
12	13.192	10.409	568	V	4	0.3934	TGNMO

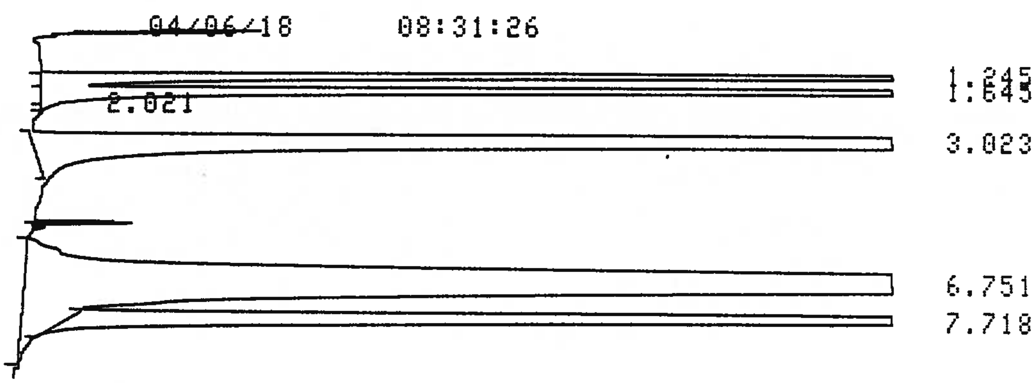
129610

N_2



CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK		IDNO	CONC	NAME
1	1.234	1	384	H	R	1	0.2666	CO
2	2.99	2.4224	1604			3	1.0086	CO2
3	5.749	4.6573	4748	S		4	3.2858	TGNMO
4	5.947	4.8177	427	T		4	0.2952	TGNMO
5	6.342	5.138	1506	TV		4	1.0422	TGNMO
6	7.075	5.7318	1305	TV		4	0.9028	TGNMO
7	7.323	5.9325	1418	TV		4	0.981	TGNMO
8	7.57	6.1326	100	TV		4	0.0692	TGNMO
		TOTAL	11490				7.8514	



CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK		IDNO	CONC	NAME
1	1.245	1	148742	H	R	1	103.3309	CO
2	1.645	1.3213	145150	H		2	103.3758	CH4
3	2.021	1.623	321	V				
4	3.023	2.4284	599616			3	377.1151	CO2
5	6.751	5.4228	243811	S		4	168.7208	TGNMO
6	7.718	6.1995	111408	T		4	77.096	TGNMO
		TOTAL	1249048				829.6385	

1.85 %

TOTAL	19846076		12482.4316

x20

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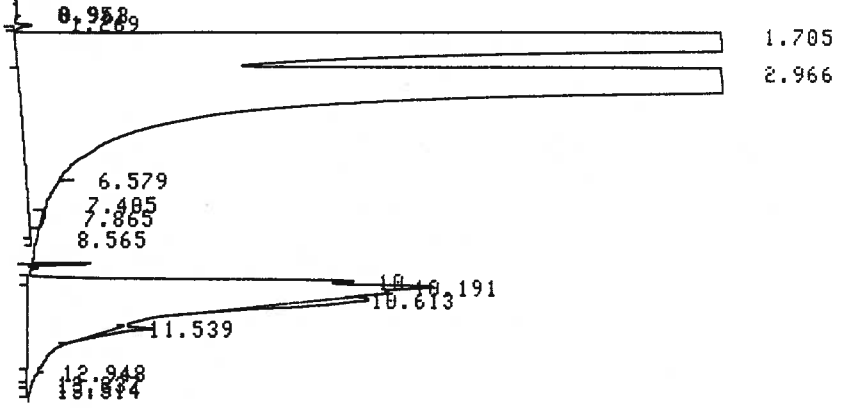
04/06/18 09:21:53



CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.269	1	517	R	1	0.3592	CO
2	1.705	1.3436	12981148	VE	2	9243.0439	CH4
3	2.966	2.3373	14918524	SVE	3	9382.4082	CO2
4	7.865	6.1978	236	T	4	0.1633	TGNMO
5	8.565	6.7494	133	V	4	0.0924	TGNMO
6	10	7.8802	17439		4	12.0788	TGNMO
7	10.191	8.031	115149	SV	4	79.7581	TGNMO
8	10.613	8.363	5463	T	4	3.7837	TGNMO
9	11.539	9.093	2228	T	4	1.543	TGNMO
10	12.948	10.2036	982	V	4	0.68	TGNMO
11	13.337	10.5096	226	V	4	0.1568	TGNMO
12	13.514	10.6496	151	V	4	0.1045	TGNMO
		TOTAL	28042182			18724.166	

141638

x20

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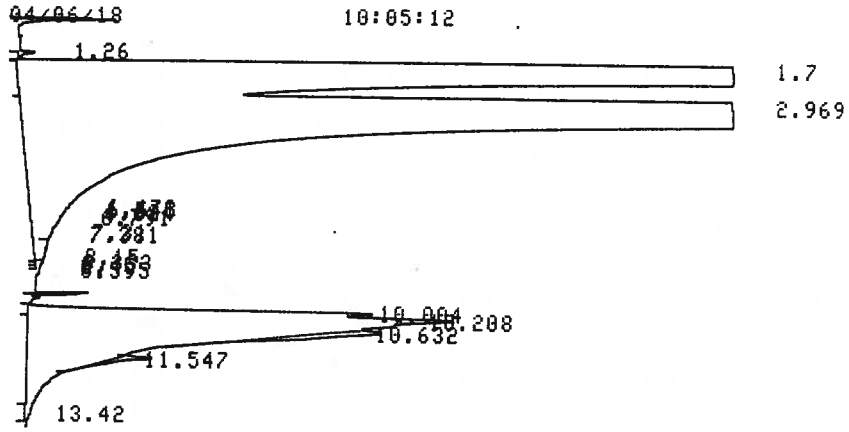


CHROMATOGRAM 1 MEMORIZED

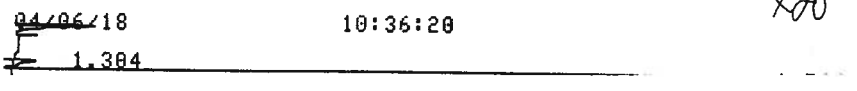
PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.26	1	487	R	1	0.338	CO
2	1.7	1.3492	12880045	E	2	9171.0546	CH4
3	2.969	2.3563	14254304	SVE	3	8964.6738	CO2
4	8.15	6.4683	82	T	4	0.0567	TGNMO
5	8.333	6.6132	203	V	4	0.1406	TGNMO
6	8.45	6.7061	77	V	4	0.0531	TGNMO
7	10.004	7.9397	17608		4	12.1959	TGNMO
8	10.208	8.1013	118924	SV	4	82.3724	TGNMO
9	10.632	8.4378	5421	T	4	3.7545	TGNMO
10	11.547	9.1643	1904	T	4	1.319	TGNMO
11	13.42	10.6508	563	V	4	0.39	TGNMO
		TOTAL	27279600			18236.3417	

144420

-9

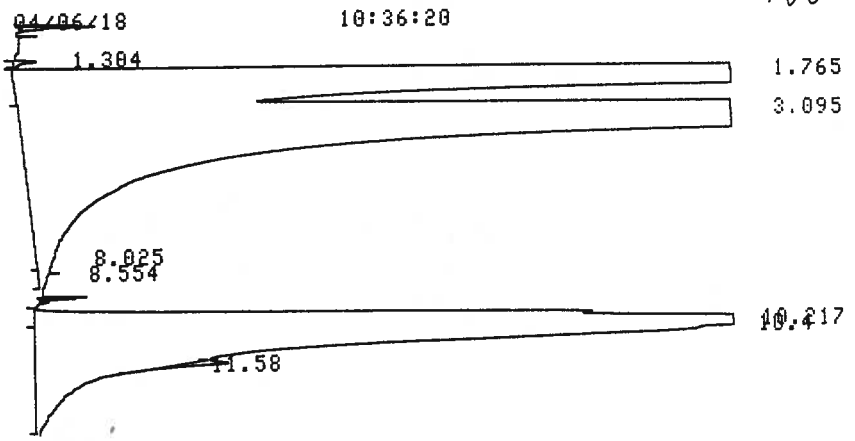
x20

04/06/18 10:36:20



TOTAL	27279600		18236.3417

9 ×20



019 223.02037.01

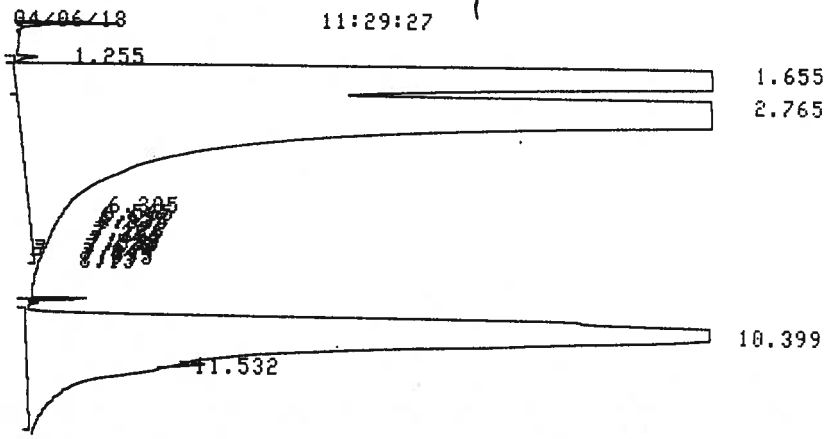
CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.304	1	615	R	1	0.4276	CO
2	1.765	1.3535	13801596	E	2	9827.2324	CH4
3	3.095	2.3735	15813748	SVE	3	9945.4228	CO2
4	8.554	6.5596	955	V	4	0.6615	TGNMO
5	10.217	7.8351	76243		4	52.8097	TGNMO
6	10.4	7.9757	180875	SV	4	125.2831	TGNMO
7	11.58	8.8804	2012	T	4	1.3934	TGNMO
	TOTAL		29876834			19953.2246	

259130

Shimadzu

9 ×20



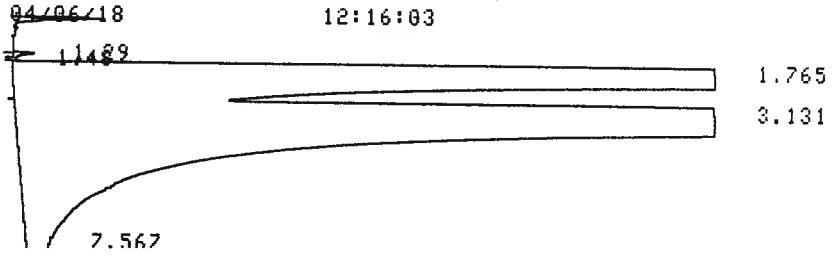
020 223.02037.01

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.255	1	615	R	1	0.4271	CO
2	1.655	1.3187	13551664	E	2	9649.2714	CH4
3	2.765	2.2035	15190563	SVE	3	9553.496	CO2
4	7.538	6.0061	64	TV	4	0.0444	TGNMO
5	7.679	6.119	72	TV	4	0.0496	TGNMO
6	7.849	6.2542	71	T	4	0.0493	TGNMO
7	10.399	8.2861	258163	S	4	178.8166	TGNMO
8	11.532	9.1891	613	T	4	0.4246	TGNMO
	TOTAL		29001816			19382.5742	

258716

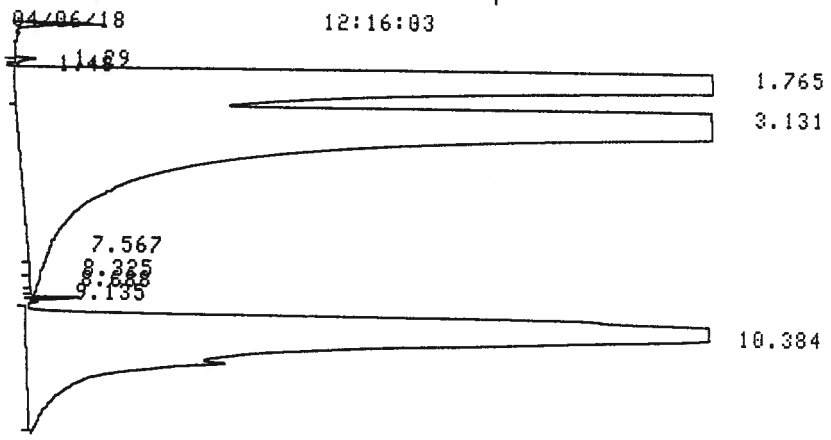
10 ×20



Shimadzu

TOTAL	29001816	19382.5742

-10 x20

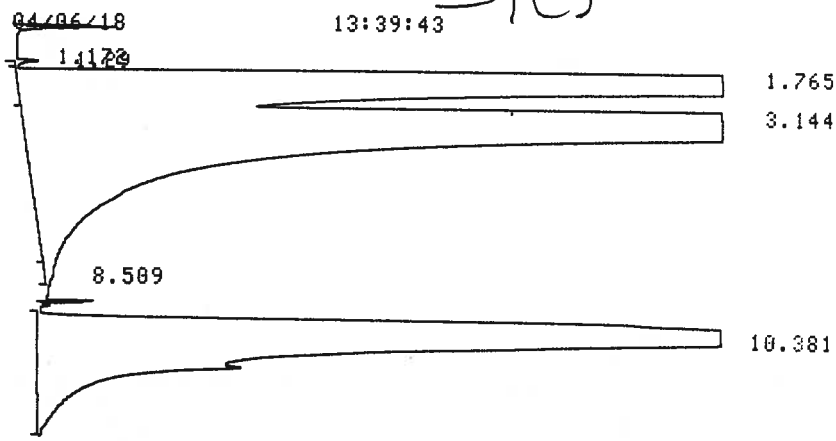


CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.29	1	608	R	1	0.4227	CO
2	1.765	1.3682	13525838	E	2	9630.8828	CH4
3	3.131	2.4269	14840996	SVE	3	9333.6494	CO2
4	8.325	6.4537	1308	V	4	0.9057	TGNMO
5	8.688	6.7346	635	V	4	0.4395	TGNMO
6	9.135	7.0817	85	V	4	0.0586	TGNMO
7	10.384	8.0496	264164	✓	4	182.9729	TGNMO
	TOTAL		28633628			19149.3281	

x10

-10 x20

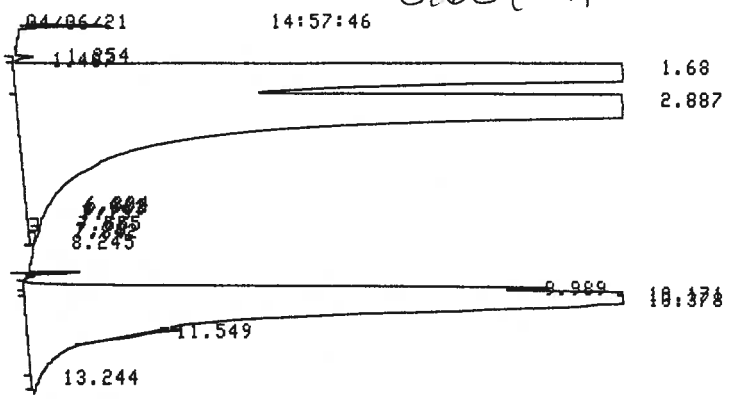


CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.29	1	683	R	1	0.4746	CO
2	1.765	1.3682	14209398	VE	2	10117.6025	CH4
3	3.144	2.4375	15895401	VE	3	9996.7753	CO2
4	8.509	6.5959	1121	V	4	0.7767	TGNMO
5	10.381	8.047	274931	✓	4	190.4308	TGNMO
	TOTAL		30381528			20306.0566	

Std OAT EPA

016854-11 ×20

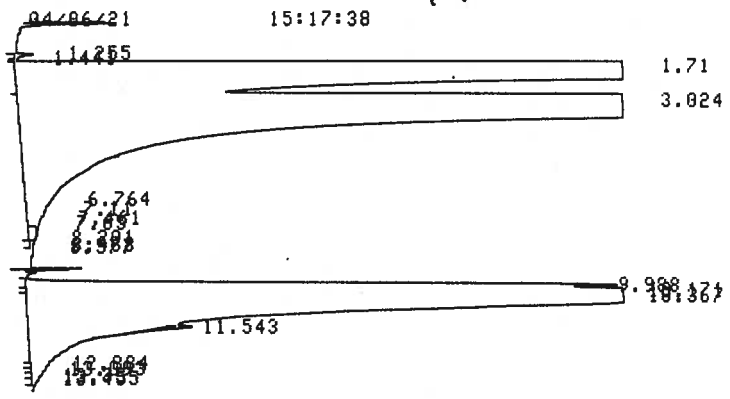


CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.254	1	622	S R	1	0.4319	CO
2	1.68	1.3397	13275467	E	2	9452.6093	CH4
3	2.887	2.3022	14407368	SVE	3	9060.9365	CO2
4	7.555	6.025	128	T	4	0.0886	TGNMO
5	7.78	6.2041	99	TV	4	0.0685	TGNMO
6	8.245	6.575	141	TV	4	0.0977	TGNMO
7	9.989	7.9654	27433		4	19.0018	TGNMO
8	10.171	8.1111	37877	V	4	26.2357	TGNMO
9	10.378	8.2757	192094	SV	4	133.0536	TGNMO
10	11.549	9.2097	1350	T	4	0.9349	TGNMO
11	13.244	10.5617	603	V	4	0.4174	TGNMO
		TOTAL	27943164			18693.8671	

259357

-11 ×20



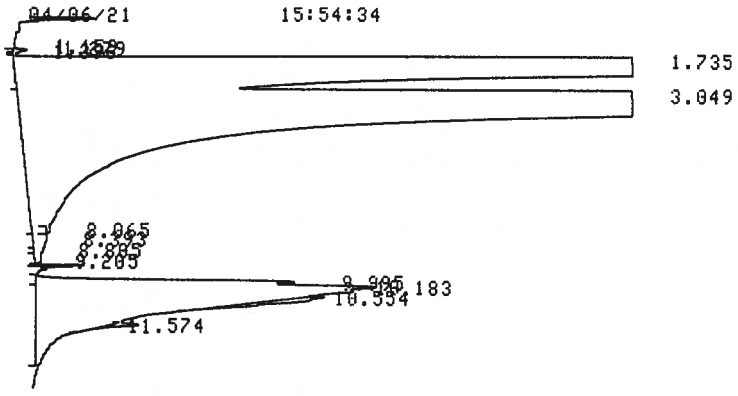
CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.255	1	555	R	1	0.3857	CO
2	1.71	1.3625	13361563	E	2	9513.913	CH4
3	3.024	2.4098	14304772	SVE	3	8996.413	CO2
4	8.201	6.5349	144	T	4	0.1	TGNMO
5	8.468	6.7474	221	V	4	0.1531	TGNMO
6	9.988	7.9583	31095		4	21.5381	TGNMO
7	10.171	8.1046	40889	V	4	28.3215	TGNMO
8	10.367	8.2606	200701	SV	4	139.0155	TGNMO
9	11.543	9.1973	1716	T	4	1.1885	TGNMO
10	12.884	10.2659	884	V	4	0.6123	TGNMO
11	13.093	10.4329	635	V	4	0.4397	TGNMO
12	13.35	10.6372	470	V	4	0.3258	TGNMO
13	13.455	10.7208	216	V	4	0.1495	TGNMO
		TOTAL	27943848			18702.5449	

276006

-12 ×20

-12 ×20

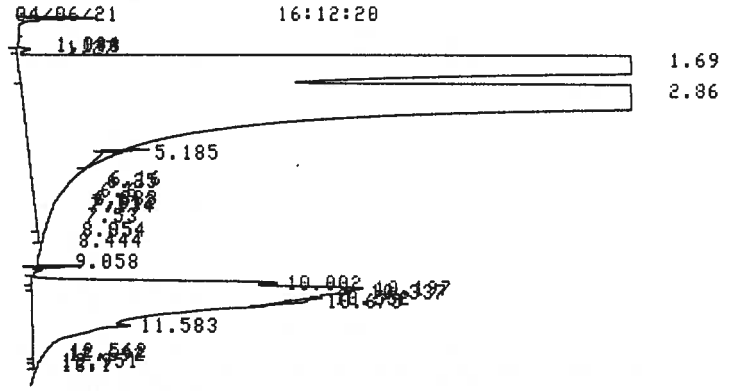


CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.279	1	413	V R	1	0.2872	CO
2	1.735	1.3569	13672371	E	2	9735.2197	CH4
3	3.049	2.3848	15302566	SVE	3	9623.9355	CO2
4	8.065	6.3074	127	T	4	0.0877	TGNMO
5	8.393	6.5639	1695	V	4	1.1738	TGNMO
6	8.805	6.8861	429	V	4	0.2969	TGNMO
7	9.205	7.1989	523	V	4	0.3624	TGNMO
8	9.995	7.8165	14242		4	9.865	TGNMO
9	10.183	7.9638	108851	SV	4	75.3959	TGNMO
10	10.554	8.2536	3984	T	4	2.7595	TGNMO
11	11.574	9.0516	1258	T	4	0.8712	TGNMO
		TOTAL	29106444			19450.2441	

128335

-12 ×20



CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.27	1	494	V R	1	0.3432	CO
2	1.69	1.3307	13600283	VE	2	9683.8906	CH4
3	2.86	2.2522	15295779	SVE	3	9619.6669	CO2
4	5.185	4.0827	1923	T	3	1.2093	CO2
5	8.444	6.6486	287	V	4	0.1985	TGNMO
6	10.002	7.8756	13952		4	9.6638	TGNMO
7	10.197	8.0294	19440	V	4	13.4648	TGNMO
8	10.337	8.1394	99625	SV	4	69.0055	TGNMO
9	10.552	8.3087	553	T	4	0.3832	TGNMO
10	10.675	8.4052	1247	TV	4	0.8636	TGNMO
11	12.951	10.1979	198	V	4	0.1373	TGNMO
12	13.1	10.315	115	V	4	0.0799	TGNMO

135127

Catalyst ...
Cr in Ni ant

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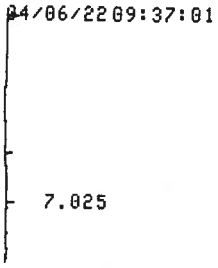

CHROMATOGRAM 1 MEMORIZED
WARNING NO PEAK

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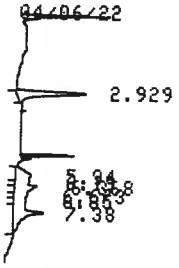

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	2.929	3736		3	2.3496	CO2
2	5.94	1685		4	1.1657	TGNMO
3	6.19	899	V	4	0.622	TGNMO
4.	6.368	1608	V	4	1.1128	TGNMO
5	6.673	767	V	4	0.5306	TGNMO
6	6.85	874	V	4	0.6052	TGNMO
7	7.38	3634	V	4	2.515	TGNMO
	TOTAL	13203			8.9089	

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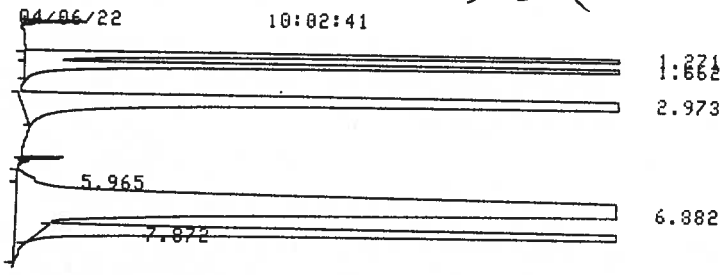
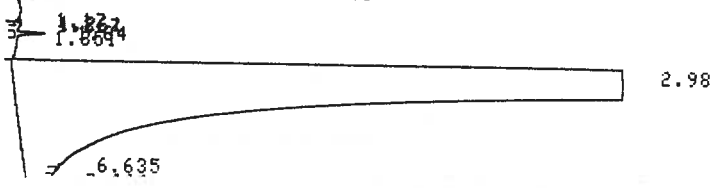


CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.271	1	146595	H R	1	101.8397	CO
2	1.662	1.3082	143373	H	2	102.11	CH4
3	2.973	2.3395	589864		3	370.982	CO2
4	5.965	4.6944	1648		4	1.1405	TGNMO
5	6.882	5.4158	236433	SV	4	163.6149	TGNMO
6	7.872	6.1949	110263	T	4	76.3032	TGNMO
	TOTAL		1228176			815.9903	

2.72 % wt/g 20/34

04/06/22 10:14:48



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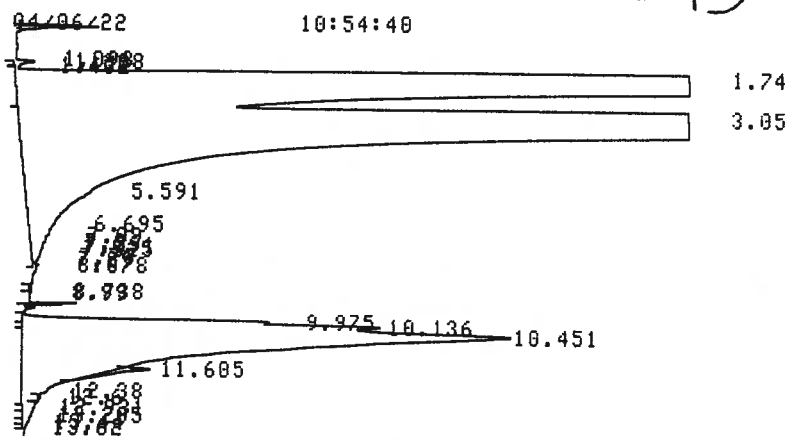

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.288	1	610	V R	1	0.4235	CO
2	1.74	1.3506	13127511	VE	2	9347.2597	CH4
3	3.05	2.3674	15225644	SVE	3	9575.5585	CO2
4	8.738	6.7827	62		4	0.0429	TGNMO
5	9.975	7.7428	9808		4	6.7936	TGNMO
6	10.136	7.8673	17940	V	4	12.426	TGNMO
7	10.451	8.1118	122590	SV	4	84.9116	TGNMO
8	11.605	9.0078	1909	T	4	1.3219	TGNMO

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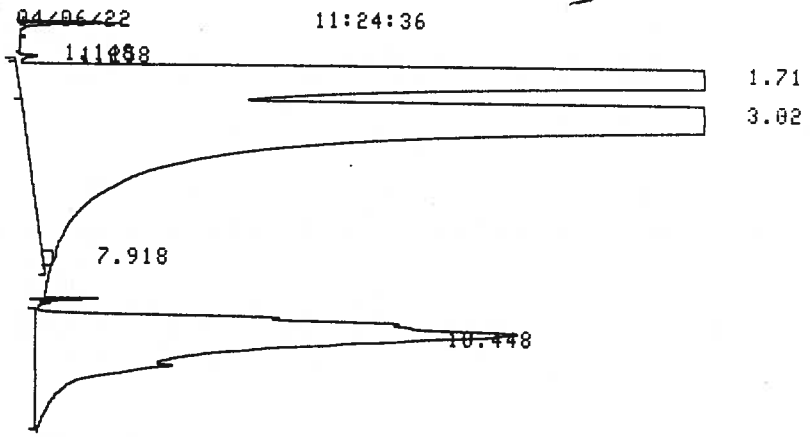
153.7226

9	12.6	9.7798	117	T	4	0.0809	TGNMO
10	12.931	10.0373	613	V	4	0.4244	TGNMO
11	13.205	10.2499	461	V	4	0.3195	TGNMO
12	13.44	10.4321	212	V	4	0.1472	TGNMO
13	13.62	10.5718	76	V	4	0.0528	TGNMO
		TOTAL	28507538			19029.7519	

-13 x20

X



CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.258	1	728	V R	1	0.5057	CO
2	1.71	1.3593	13198919	VE	2	9398.1044	CH4
3	3.02	2.4006	15536705	SVE	3	9771.1884	CO2
4	7.918	6.2944	151	T	4	0.1048	TGNMO
5	10.448	8.3055	160527 ✓		4	111.1889	TGNMO
		TOTAL	28897026			19281.0878	

-14 x20

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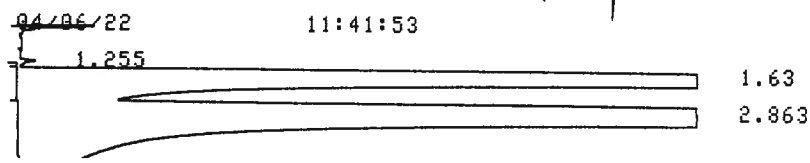

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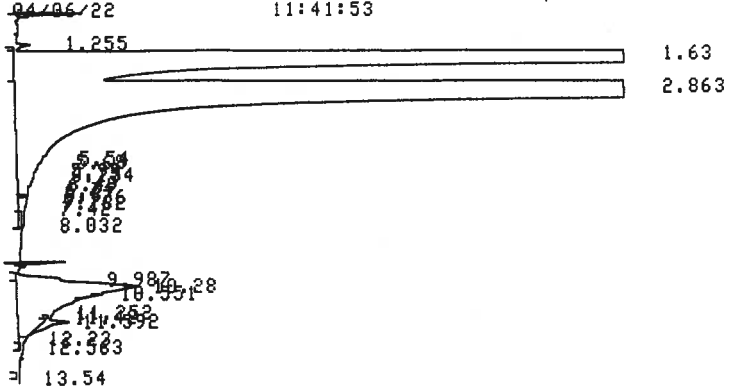

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.255	1	509	R	1	0.3539	CO
2	1.63	1.2991	6402190	E	2	4558.5888	CH4
3	2.863	2.2816	5887019	SV	3	3702.4045	CO2
4	6.87	5.4756	69	TV	4	0.0479	TGNMO
5	8.032	6.4017	261	T	4	0.1805	TGNMO
6	9.987	7.9599	2022		4	1.4005	TGNMO
7	10.28	8.1934	33358	SV	4	23.1052	TGNMO
8	10.551	8.4094	171	T	4	0.1184	TGNMO
9	11.42	9.1023	78	TV	4	0.0542	TGNMO
10	11.592	9.2394	2032	TV	4	1.4077	TGNMO
11	12.563	10.013	87	T	4	0.0599	TGNMO
12	13.54	10.7917	78		4	0.0543	TGNMO
		TOTAL	12327870			8287.7714	

37826

378260

-14

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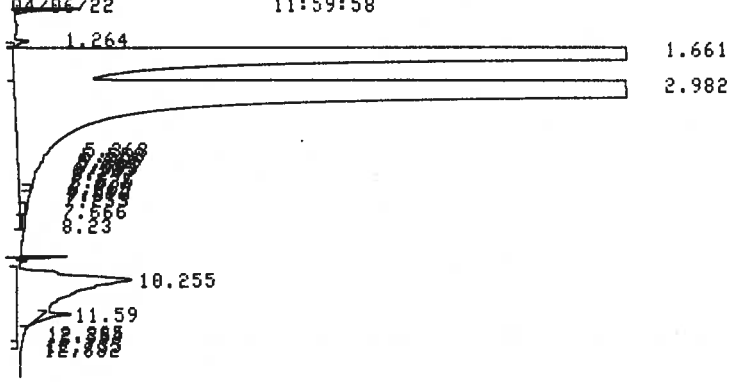

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.264	1	448	R	1	0.3113	CO
2	1.661	1.3143	6313079		2	4495.1391	CH4
3	2.982	2.3589	5743288	SV	3	3612.0107	CO2
4	6.769	5.355	79	TV	4	0.0548	TGNMO
5	7.666	6.0651	73	TV	4	0.0508	TGNMO
6	8.23	6.5111	171	T	4	0.1184	TGNMO
7	10.255	8.1131	34013	S	4	23.5594	TGNMO
8	11.59	9.169	1850	T	4	1.2813	TGNMO
9	12.735	10.0752	181	V	4	0.1254	TGNMO
		TOTAL	12093179			8132.6499	

36044

5tl

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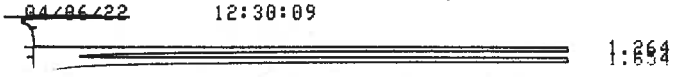

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4	6.769	5.355	79	TV	4	0.0548	TGNMO
5	7.666	6.0651	73	TV	4	0.0508	TGNMO
6	8.23	6.5111	171	T	4	0.1184	TGNMO
7	10.255	8.1131	34013	S	4	23.5594	TGNMO
8	11.59	9.169	1850	T	4	1.2813	TGNMO
9	12.735	10.0752	181	V	4	0.1254	TGNMO
		TOTAL	12093179			8132.6499	

36044

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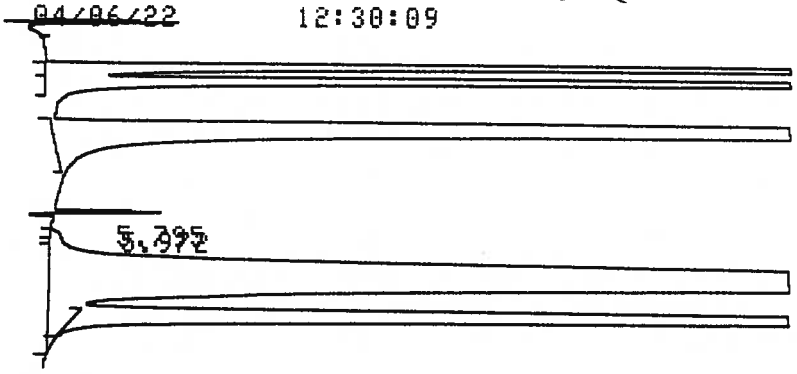

041 223 02037-01

CHROMATOGRAM 1 MEMORIZED

PKNO	TIME	RRT	AREA	MK	IDNO	CONC	NAME
1	1.264	1	143778	H R	1	99.8826	CO
2	1.654	1.3085	141285	H	2	100.6229	CH4
3	2.957	2.3397	582070		3	366.0801	CO2
4	5.795	4.5847	381		4	0.2638	TGNMO
5	5.972	4.7249	502	V	4	0.3473	TGNMO
6	6.904	5.462	228588	SV	4	158.1858	TGNMO
7	7.941	6.2822	109497	T	4	75.7734	TGNMO
		TOTAL	1206100			801.1558	

⊕ Shimad.

APPENDIX F

LAEEM TIER 2 MODEL OUTPUTS

TABLE 1. PROJECTED LFG AND NMOC GENERATION RATES (675 ppm)
Phase II, White Street Landfill - Greensboro, North Carolina

Year	Disposal Rate (tons/yr)	Refuse In-Place (tons)	Disposal Rate (Mg/yr)	Refuse In-Place (Mg)	Methane Generation Rates (m^3/yr)	LFG Generation Rates (cfm)	LFG Generation Rates (Million ft^3/yr)	NMOC Generation Rates (tons/yr)	NMOC Generation Rates (Mg/yr)
1978	240,000	0	217,724	0	0.000E+00	0	0	0	0
1979	240,000	240,000	217,724	217,724	1.851E+06	249	131	10	9
1980	240,000	480,000	217,724	435,449	3.611E+06	485	255	19	17
1981	240,000	720,000	217,724	653,173	5.286E+06	710	373	28	25
1982	240,000	960,000	217,724	870,897	6.878E+06	924	486	36	33
1983	240,000	1,200,000	217,724	1,088,622	8.394E+06	1,128	593	44	40
1984	240,000	1,440,000	217,724	1,306,346	9.835E+06	1,322	695	52	47
1985	239,000	1,680,000	216,817	1,524,070	1.121E+07	1,506	791	59	53
1986	262,000	1,919,000	237,682	1,740,888	1.250E+07	1,680	883	66	59
1987	292,000	2,181,000	264,898	1,978,570	1.391E+07	1,870	983	73	66
1988	344,000	2,473,000	312,072	2,243,468	1.549E+07	2,081	1,094	81	74
1989	342,000	2,817,000	310,257	2,555,539	1.738E+07	2,336	1,228	91	83
1990	340,000	3,159,000	308,443	2,865,797	1.917E+07	2,576	1,354	101	91
1991	331,000	3,499,000	300,278	3,174,239	2.086E+07	2,803	1,473	109	99
1992	292,000	3,830,000	264,898	3,474,518	2.239E+07	3,009	1,582	117	107
1993	236,292	4,122,000	214,360	3,739,416	2.355E+07	3,165	1,664	124	112
1994	240,746	4,358,292	218,401	3,953,776	2.423E+07	3,256	1,711	127	115
1995	257,407	4,599,038	233,516	4,172,177	2.490E+07	3,346	1,759	131	118
1996	290,370	4,856,445	263,419	4,405,693	2.567E+07	3,450	1,813	135	122
1997	268,815	5,146,815	243,865	4,669,112	2.666E+07	3,582	1,883	140	127
1998	0	5,415,630	0	4,912,977	2.743E+07	3,686	1,938	144	131
1999	0	5,415,630	0	4,912,977	2.609E+07	3,507	1,843	137	124
2000	0	5,415,630	0	4,912,977	2.482E+07	3,336	1,753	130	118
2001	0	5,415,630	0	4,912,977	2.361E+07	3,173	1,668	124	112
2002	0	5,415,630	0	4,912,977	2.246E+07	3,018	1,586	118	107
2003	0	5,415,630	0	4,912,977	2.136E+07	2,871	1,509	112	102
2004	0	5,415,630	0	4,912,977	2.032E+07	2,731	1,435	107	97
2005	0	5,415,630	0	4,912,977	1.933E+07	2,598	1,365	101	92
2006	0	5,415,630	0	4,912,977	1.839E+07	2,471	1,299	96	87
2007	0	5,415,630	0	4,912,977	1.749E+07	2,350	1,235	92	83
2008	0	5,415,630	0	4,912,977	1.664E+07	2,236	1,175	87	79
2009	0	5,415,630	0	4,912,977	1.583E+07	2,127	1,118	83	75
2010	0	5,415,630	0	4,912,977	1.506E+07	2,023	1,063	79	72
2011	0	5,415,630	0	4,912,977	1.432E+07	1,924	1,011	75	68
2012	0	5,415,630	0	4,912,977	1.362E+07	1,831	962	71	65
2013	0	5,415,630	0	4,912,977	1.296E+07	1,741	915	68	62
2014	0	5,415,630	0	4,912,977	1.233E+07	1,656	871	65	59
2015	0	5,415,630	0	4,912,977	1.172E+07	1,576	828	61	56
2016	0	5,415,630	0	4,912,977	1.115E+07	1,499	788	58	53
2017	0	5,415,630	0	4,912,977	1.061E+07	1,426	749	56	50
2018	0	5,415,630	0	4,912,977	1.009E+07	1,356	713	53	48
2019	0	5,415,630	0	4,912,977	9.600E+06	1,290	678	50	46
2020	0	5,415,630	0	4,912,977	9.131E+06	1,227	645	48	43
2021	0	5,415,630	0	4,912,977	8.686E+06	1,167	613	46	41
2022	0	5,415,630	0	4,912,977	8.262E+06	1,110	584	43	39

ESTIMATED NMOC CONCENTRATION IN LFG: 675 ppmv
ASSUMED METHANE CONTENT OF LFG: 50%
SELECTED DECAY RATE CONSTANT: 0.05
SELECTED ULTIMATE METHANE RECOVERY RATE 5,446 ft3/ton
METRIC EQUIVALENT: 170 cu m/Mg

TABLE 2. PROJECTED LFG AND NMOC GENERATION RATES (1,307 ppm)
Phase III, Cell 1 White Street Landfill - Greensboro, North Carolina

Year	Disposal Rate (tons/yr)	Refuse In-Place (tons)	Disposal Rate (Mg/yr)	Refuse In-Place (Mg)	Methane Generation Rates (m^3/yr)	LFG Generation Rates (cfm)	LFG Generation Rates (Million ft^3/yr)	NMOC Generation Rates (tons/yr)	NMOC Generation Rates (Mg/yr)
1997	8,608	0	7,809	0	0.000E+00	0	0	0	0
1998	255,306	8,608	231,610	7,809	6.638E+04	9	5	1	1
1999	262,512	263,914	238,147	239,419	2.032E+06	273	144	21	19
2000	271,562	526,426	246,357	477,566	3.957E+06	532	279	40	36
2001	136,534	797,988	123,862	723,923	5.858E+06	787	414	59	54
2002	0	934,522	0	847,784	6.625E+06	890	468	67	61
2003	0	934,522	0	847,784	6.302E+06	847	445	64	58
2004	0	934,522	0	847,784	5.995E+06	806	423	61	55
2005	0	934,522	0	847,784	5.702E+06	766	403	58	53
2006	0	934,522	0	847,784	5.424E+06	729	383	55	50
2007	0	934,522	0	847,784	5.160E+06	693	364	52	48
2008	0	934,522	0	847,784	4.908E+06	660	347	50	45
2009	0	934,522	0	847,784	4.669E+06	627	330	47	43
2010	0	934,522	0	847,784	4.441E+06	597	314	45	41
2011	0	934,522	0	847,784	4.224E+06	568	298	43	39
2012	0	934,522	0	847,784	4.018E+06	540	284	41	37
2013	0	934,522	0	847,784	3.822E+06	514	270	39	35
2014	0	934,522	0	847,784	3.636E+06	489	257	37	33
2015	0	934,522	0	847,784	3.459E+06	465	244	35	32
2016	0	934,522	0	847,784	3.290E+06	442	232	33	30
2017	0	934,522	0	847,784	3.130E+06	421	221	32	29
2018	0	934,522	0	847,784	2.977E+06	400	210	30	27
2019	0	934,522	0	847,784	2.832E+06	381	200	29	26
2020	0	934,522	0	847,784	2.694E+06	362	190	27	25
2021	0	934,522	0	847,784	2.562E+06	344	181	26	24
2022	0	934,522	0	847,784	2.437E+06	328	172	25	22
2023	0	934,522	0	847,784	2.318E+06	312	164	24	21
2024	0	934,522	0	847,784	2.205E+06	296	156	22	20
2025	0	934,522	0	847,784	2.098E+06	282	148	21	19
2026	0	934,522	0	847,784	1.995E+06	268	141	20	18
2027	0	934,522	0	847,784	1.898E+06	255	134	19	17
2028	0	934,522	0	847,784	1.806E+06	243	128	18	17
2029	0	934,522	0	847,784	1.718E+06	231	121	17	16
2030	0	934,522	0	847,784	1.634E+06	220	115	17	15
2031	0	934,522	0	847,784	1.554E+06	209	110	16	14
2032	0	934,522	0	847,784	1.478E+06	199	104	15	14
2033	0	934,522	0	847,784	1.406E+06	189	99	14	13
2034	0	934,522	0	847,784	1.338E+06	180	94	14	12
2035	0	934,522	0	847,784	1.272E+06	171	90	13	12
2036	0	934,522	0	847,784	1.210E+06	163	85	12	11
2037	0	934,522	0	847,784	1.151E+06	155	81	12	11
2038	0	934,522	0	847,784	1.095E+06	147	77	11	10
2039	0	934,522	0	847,784	1.042E+06	140	74	11	10
2040	0	934,522	0	847,784	9.909E+05	133	70	10	9
2041	0	934,522	0	847,784	9.426E+05	127	67	10	9

ESTIMATED NMOC CONCENTRATION IN LFG: 1307 ppmv
ASSUMED METHANE CONTENT OF LFG: 50%
SELECTED DECAY RATE CONSTANT: 0.05
SELECTED ULTIMATE METHANE RECOVERY RATE 5,446 ft3/ton
METRIC EQUIVALENT: 170 cu m/Mg

TABLE 3. PROJECTED LFG AND NMOC GENERATION RATES (640 ppm)
Phase III, Cell 2 White Street Landfill - Greensboro, North Carolina

Year	Disposal Rate (tons/yr)	Refuse In-Place (tons)	Disposal Rate (Mg/yr)	Refuse In-Place (Mg)	Methane Generation Rates (m^3/yr)	LFG Generation Rates (cfm)	LFG Generation Rates (Million ft^3/yr)	NMOC Generation Rates (tons/yr)	NMOC Generation Rates (Mg/yr)
2001	130,102	0	118,027	0	0.000E+00	0	0	0	0
2002	260,109	130,102	235,967	118,027	1.003E+06	135	71	5	5
2003	195,595	390,211	177,441	353,993	2.960E+06	398	209	15	13
2004	128,336	585,806	116,424	531,434	4.324E+06	581	305	22	20
2005	134,753	714,142	122,246	647,859	5.103E+06	686	360	25	23
2006	141,490	848,895	128,358	770,105	5.893E+06	792	416	29	27
2007	148,565	990,385	134,776	898,462	6.697E+06	900	473	33	30
2008	155,993	1,138,950	141,514	1,033,238	7.516E+06	1,010	531	37	34
2009	163,793	1,294,943	148,591	1,174,753	8.352E+06	1,122	590	42	38
2010	0	1,458,736	0	1,323,343	9.208E+06	1,237	650	46	42
2011	0	1,458,736	0	1,323,343	8.759E+06	1,177	619	44	40
2012	0	1,458,736	0	1,323,343	8.331E+06	1,120	588	41	38
2013	0	1,458,736	0	1,323,343	7.925E+06	1,065	560	39	36
2014	0	1,458,736	0	1,323,343	7.539E+06	1,013	532	37	34
2015	0	1,458,736	0	1,323,343	7.171E+06	964	506	36	32
2016	0	1,458,736	0	1,323,343	6.821E+06	917	482	34	31
2017	0	1,458,736	0	1,323,343	6.488E+06	872	458	32	29
2018	0	1,458,736	0	1,323,343	6.172E+06	829	436	31	28
2019	0	1,458,736	0	1,323,343	5.871E+06	789	415	29	26
2020	0	1,458,736	0	1,323,343	5.585E+06	750	394	28	25
2021	0	1,458,736	0	1,323,343	5.312E+06	714	375	26	24
2022	0	1,458,736	0	1,323,343	5.053E+06	679	357	25	23
2023	0	1,458,736	0	1,323,343	4.807E+06	646	339	24	22
2024	0	1,458,736	0	1,323,343	4.572E+06	614	323	23	21
2025	0	1,458,736	0	1,323,343	4.349E+06	584	307	22	20
2026	0	1,458,736	0	1,323,343	4.137E+06	556	292	21	19
2027	0	1,458,736	0	1,323,343	3.935E+06	529	278	20	18
2028	0	1,458,736	0	1,323,343	3.744E+06	503	264	19	17
2029	0	1,458,736	0	1,323,343	3.561E+06	479	252	18	16
2030	0	1,458,736	0	1,323,343	3.387E+06	455	239	17	15
2031	0	1,458,736	0	1,323,343	3.222E+06	433	228	16	15
2032	0	1,458,736	0	1,323,343	3.065E+06	412	216	15	14
2033	0	1,458,736	0	1,323,343	2.915E+06	392	206	14	13
2034	0	1,458,736	0	1,323,343	2.773E+06	373	196	14	13
2035	0	1,458,736	0	1,323,343	2.638E+06	354	186	13	12
2036	0	1,458,736	0	1,323,343	2.509E+06	337	177	12	11
2037	0	1,458,736	0	1,323,343	2.387E+06	321	169	12	11
2038	0	1,458,736	0	1,323,343	2.271E+06	305	160	11	10
2039	0	1,458,736	0	1,323,343	2.160E+06	290	153	11	10
2040	0	1,458,736	0	1,323,343	2.054E+06	276	145	10	9
2041	0	1,458,736	0	1,323,343	1.954E+06	263	138	10	9
2042	0	1,458,736	0	1,323,343	1.859E+06	250	131	9	8
2043	0	1,458,736	0	1,323,343	1.768E+06	238	125	9	8
2044	0	1,458,736	0	1,323,343	1.682E+06	226	119	8	8
2045	0	1,458,736	0	1,323,343	1.600E+06	215	113	8	7

ESTIMATED NMOC CONCENTRATION IN LFG: 640 ppmv
ASSUMED METHANE CONTENT OF LFG: 50%
SELECTED DECAY RATE CONSTANT: 0.05
SELECTED ULTIMATE METHANE RECOVERY RATE 5,446 ft3/ton
METRIC EQUIVALENT: 170 cu m/Mg